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EXCAVATIONS AT WHITIPIRORUA, T12/16, COROMANDEL PENINSULA

LOUISE FUREY

AUCKLAND

Abstract. Excavations at Whitipirorua, or Onemana, were carried out in 1986 and 1988, providing information to enable the large collection of artefacts previously recovered from the site to be put into an archaeological perspective.

An early or Archaic beach midden, the site has three distinct periods of occupation. Radiocarbon age estimates indicate that occupation occurred in the 14th and 15th centuries.

Shell midden, firescoops, postholes and a pit were found. Midden remains were typical of a Coromandel Peninsula Archaic site. Local stone materials of chert and obsidian were utilised along with imported obsidian and basalt. Artefacts were scarce in the excavated area.

Whitipirorua is interpreted as a large occupation site, tending to the more permanently occupied end of the settlement pattern spectrum.

T12/16 is situated on the beach front at Onemana on the eastern side of the Coromandel Peninsula (Fig. 1) and is commonly referred to as Whitipirorua, the traditional name for the area. Archaeologists have been aware of the site for a number of years and periodically artefacts were collected as they were exposed on the surface through sand deflation. Many of the artefact types identified the site as belonging to the early settlement, or Archaic, period.

The site was first brought to the attention of archaeologists by R.G.W. (Bob) Jolly who regularly visited Whitipirorua from the early 1960s to the mid-1970s. During this period part of the site was exposed and cultural material was visible on the surface. Artefacts and samples collected by Jolly are held in the Auckland Museum and have been described by Furey (1990). Like many similar sites on the beach dunes of the Coromandel Peninsula, Whitipirorua was partially destroyed during construction of a housing subdivision in the mid-1970s.

A further threat to the site was brought to the author's attention in 1986 when the management plan for the recreation reserve within which the site is situated showed that a dinghy ramp was to be constructed through the remaining part. After negotiation the Thames Coromandel District Council, as reserve administrators, agreed to protect the site by placing a clay capping over the exposed cultural layers if it could be shown that a sufficient amount of the site remained to justify this. At the same time a research project would allow recovery of information about the site stratigraphy which might enable the artefact collection to be placed in context. In

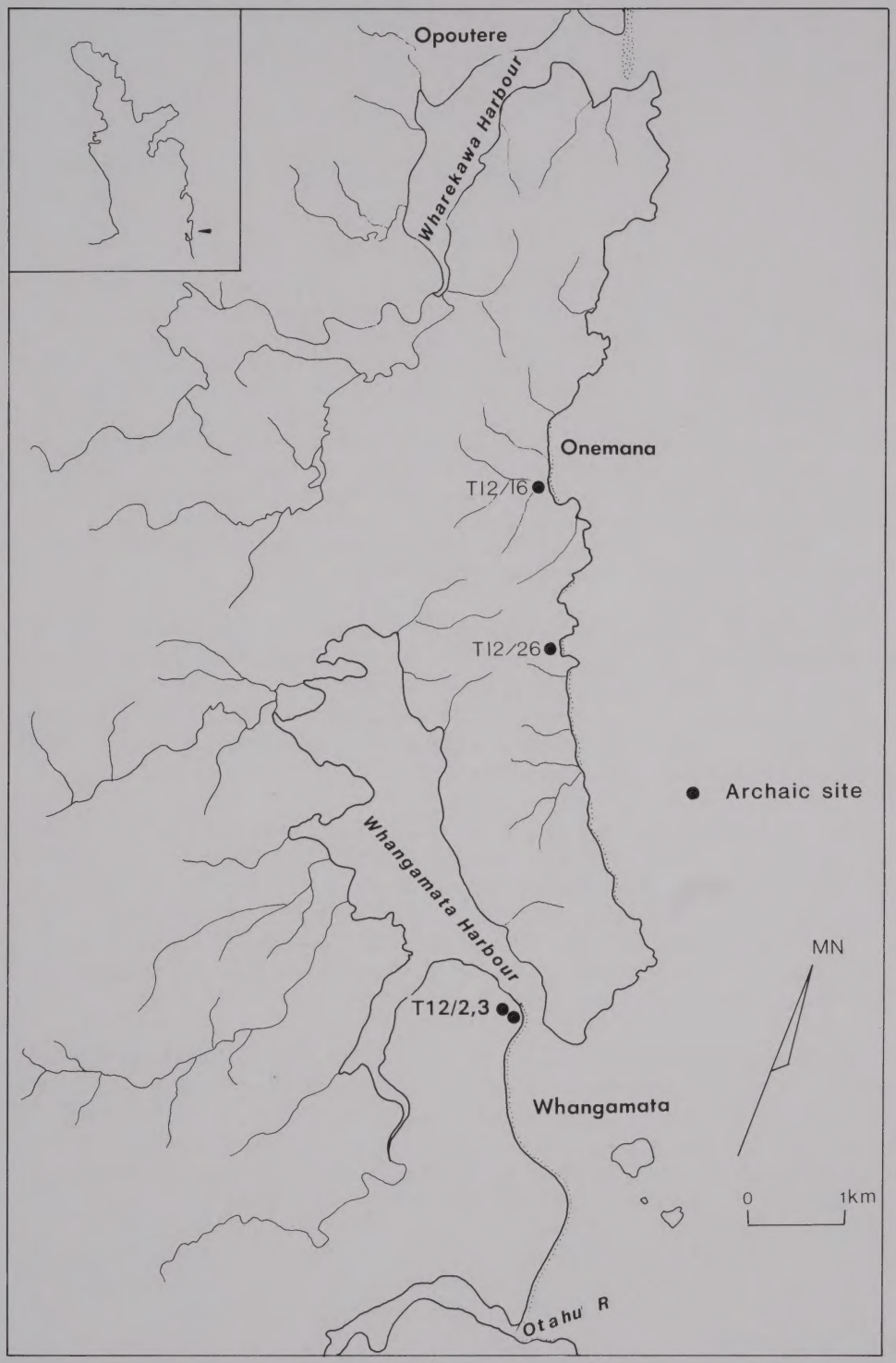


Fig. 1. Locality map.

addition a radiocarbon date, or series of dates, would contribute to data on early settlement of the Coromandel east coast.

The setting

Onemana Beach is approximately 900 m long and has one main stream which discharges near the centre of the beach, with another intermittent water course at the southern end. The site, T12/16, is situated between these two streams. A rocky headland with pa (T12/23) is situated at the south end of the beach, while to the north cliffs and steep slopes back the sand beach for approximately 400 m. T12/21, also a pa, is at the northern end of the main dune area (Fig. 2). The beach itself shelves steeply and the only boat launching area is at the southern end.

Behind the dune area are spurs which join to a central ridge system running along Whitipirorua Peninsula from Whangamata Harbour north to Wharekawa Harbour. During earthworks for the residential subdivision the toe ends of the spurs were recontoured and spoil pushed forward, covering part of the dune area.

Whitipirorua Peninsula is the source of several stone materials important to the Maori. Chert and obsidian both occur here. Outcrops of chert are present on the central ridge behind Onemana Beach although none show evidence of having been utilised in any way (J. Coster pers. comm.). Obsidian, in boulder or cobble form, occurs through clay subsoil on the spurs behind the dune area at Onemana, and also in stream beds and beaches on the western side of the Whitipirorua Peninsula, fronting the Whangamata Harbour. This local obsidian is present in the site.

Jolly excavations

Jolly carried out excavations at Whitipirorua over a number of years. His attention was drawn to the site in 1956 when evidence of fishhook manufacturing was exposed by erosion (Jolly 1978a:129). Over the years Jolly concentrated on this part of the site near the stream. The main focus of activity was referred to as 'Site 1' and 'Site 2' (also named 'Molly's Site') although many other excavations, variously named 'Top Site' and 'Eggshell Square', were also investigated. Stratigraphic information from all of this work is sketchy and plans and maps non-existent.

Jolly (1978a:130) described a generalised stratigraphy: "The main culture layer is beneath sand with ordinary shell midden above. In some places the layer is about 30 cm thick, in others about 1 metre. Mussels must have been easily obtained by the first comers as many shells rest close to the natural sand." Many of the artefacts came from a layer of dark sand in which no shell midden was present (M. Hougaard pers. comm. 1988). Although Jolly refers to 'Site 1' and 'Site 2', they were, in Hougaard's opinion, part of the same activity area.

In 1964 Molly Nicholls (later Hougaard) made a sketch map of the exposed parts of the site, including the locations of 'Site 1' and 'Site 2' (Jolly 1978a:131). With the assistance of aerial photographs of 1966 and 1978, some of these site features have been identified and located in relation to the present day topography (Fig. 2). From Nicholls' map it is apparent that there were concentrations of certain activities, for

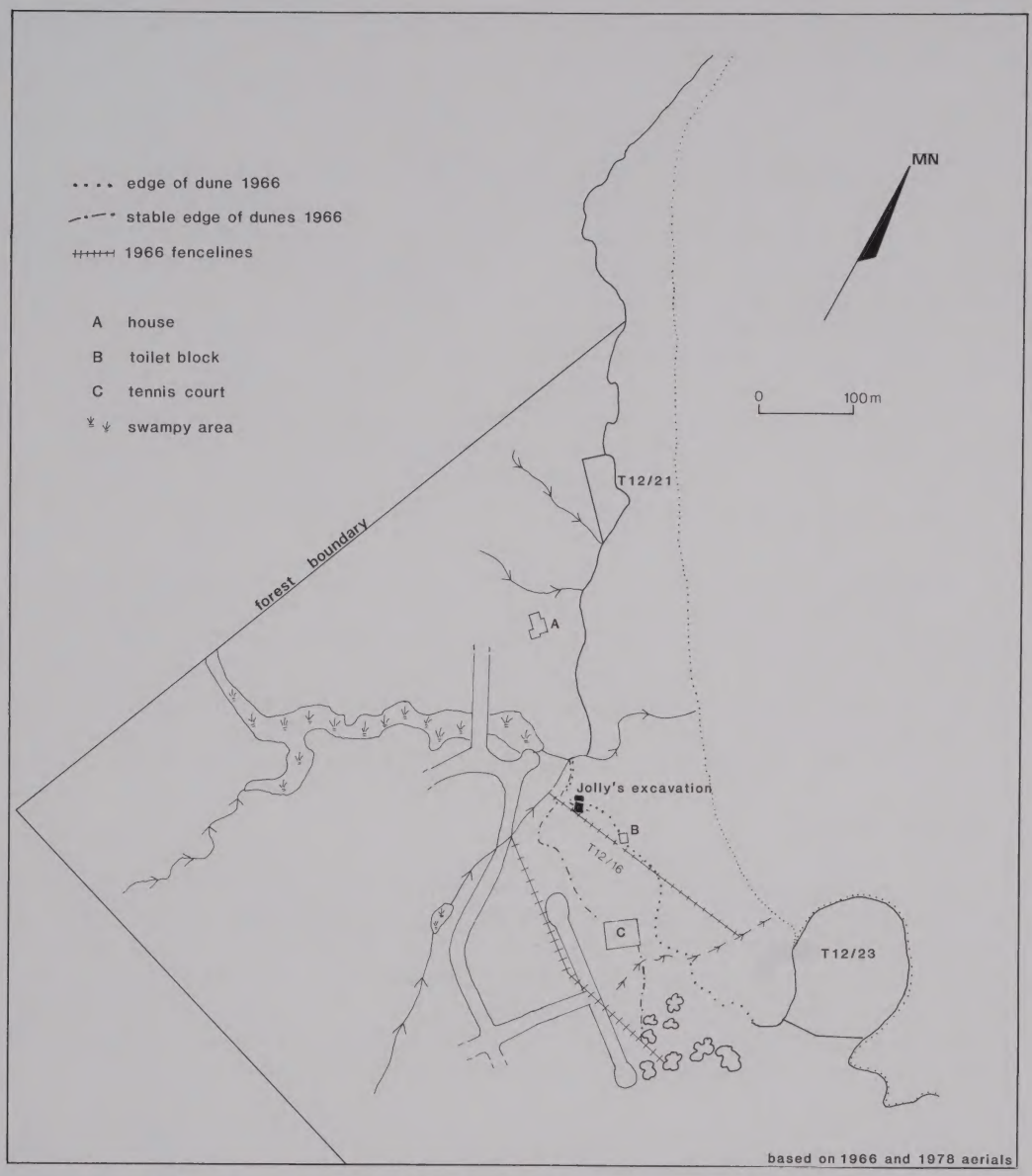


Fig. 2. Whitipirorua site, Onemana, showing location of Jolly's excavations.

example stone flaking below the present tennis court and toilet block, and a black discolouration of the sand approximately mid-way between the two (this was identified in the 1986 and 1988 excavation squares 5-8 in the same location).

By 1974 the subdivision development was underway. The area near Jolly's excavations was being quarried for sand to act as a bedding material in pipe trenches. Material exposed during this operation has been described as containing "basalt, chert and obsidian flakes and fragments of rectangular basalt adzes" (Jeremy Spencer pers. comm. 1987).

ARCHAEOLOGICAL EXCAVATIONS 1986 and 1988

The site in 1986 was evident on the seaward side of the dune as an exposed brown or black cultural layer with displaced shell midden, stone flakes and general stone material. Cultural material has been evident on the surface for a number of years and the eroding edge in one place has moved landwards by nearly 10 m since the mid-1970s, based on author's observations.

The 1986 excavation strategy was to open up a number of squares immediately behind the eroding edge of the cultural layers. However, the available area was limited to within the uncapped sand dune as the amount of effort required to remove clay overburden was not warranted for the short fieldwork period, nor was it desirable as that part of the site was already well protected from erosion.

Six 2 x 2 m squares (numbered 1-6) were excavated over five days in 1986 (N.Z. Historic Places Trust Permit 1986/29). In addition, several testholes were dug or augered to the north of the toilet block to locate any remaining evidence of the site in the vicinity of Jolly's excavations (Fig. 3).

In 1988 two further 2 x 2 m squares (numbered 7 and 8) were excavated (N.Z.H.P.T. Permit 1988/8) to clarify problems in stratigraphic interpretation.

STRATIGRAPHY

Square 1. This consisted of an isolated knoll of apparently intact cultural material surrounded by an area of deflated sand littered with stone flakes and midden.

A dark brownish-black sand, 50-160 mm in thickness, was excavated and contained charcoal, shell and fish bone. This rested on light brown sterile sand. At the interface of the two layers were a number of dog coprolites containing fish bone fragments. These items provided a distinctive marker layer which occurred over most of the excavated area of the site. Sterile white beach sand underlay the culturally deposited layers.

Within the excavated square a piece of worked paua shell with notches along one side was recovered from deflated sand. Artefacts previously recovered from the vicinity of this 'island' of intact material include bone needles and several similarly shaped pieces of worked paua shell (Furey 1990:36).

Square 2. Placed over the eroding face of the occupation material, this square had evidence of several cultural layers separated by sterile sand (Fig. 4).

Layer 1, common to all the site, was windblown sand. Below was grey greasy sand containing shell which was identified as Layer 2. Shell included abundant *Chione stutchburyi* (cockle), *Perna* sp. (mussel) and *Paphies australis* (pipi), also *Turbo smaragdus* (cat's eye), *Nerita melanotrogus* (black nerita), *Amphibola crenata* (mudsnail), *Cominella* sp. (speckled whelk), *Struthiolaria papulosa* (ostrich foot), *Thais orbita* (white rock shell), *Haliotis* sp. (paua) and *Crassostrea glomerata* (oyster). No identifiable bone was recovered but small brown smudges within the sand were

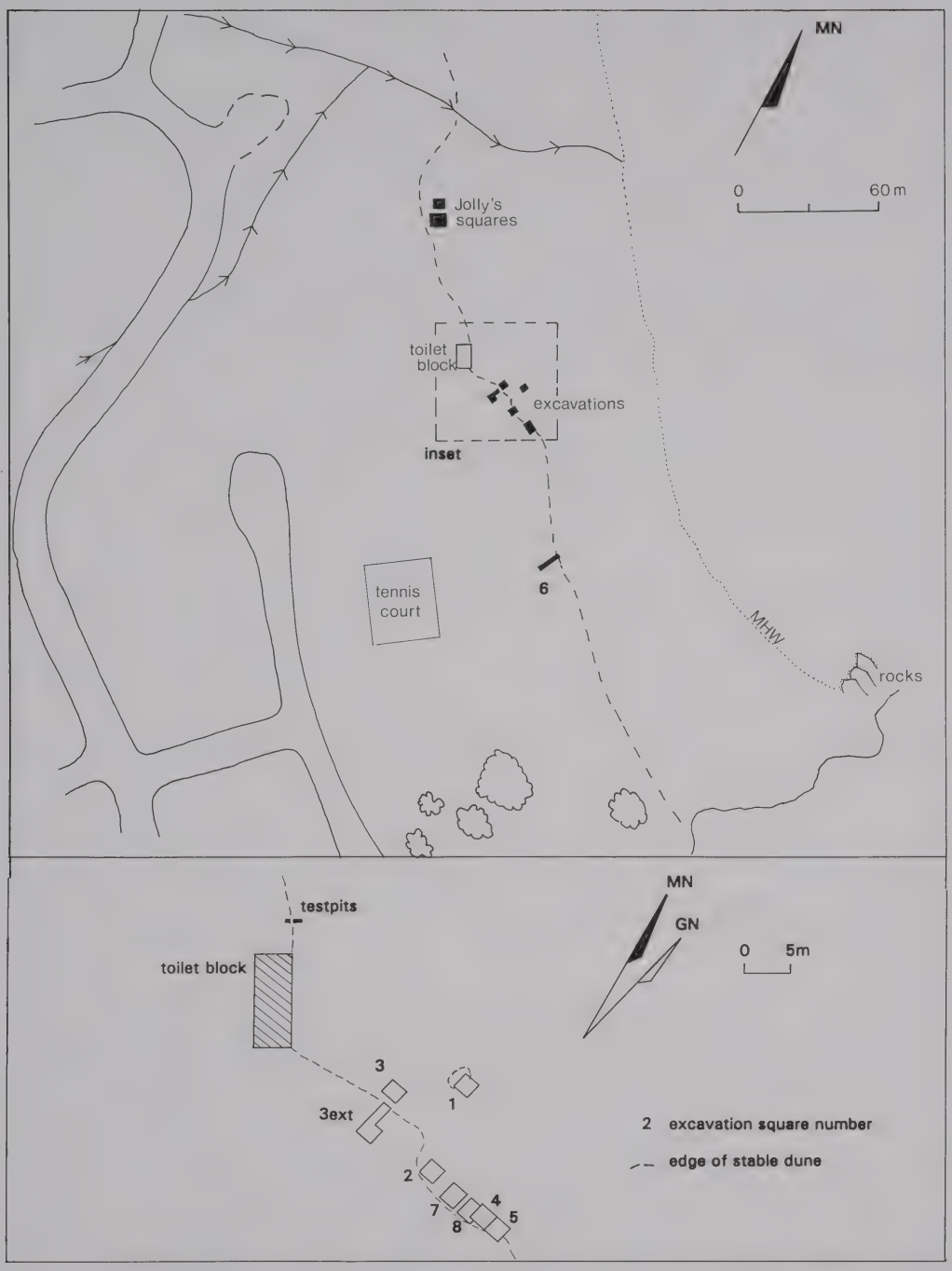


Fig. 3. T12/16, showing recent excavations and Jolly's Site 1 and 2.

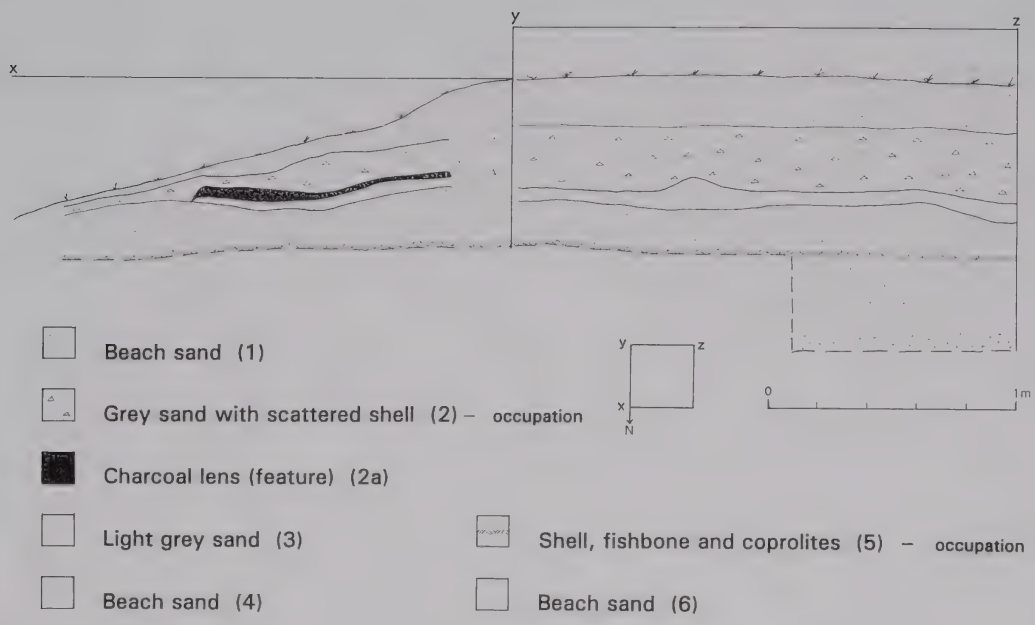


Fig. 4. T12/16, Square 2, stratigraphy.

interpreted as decomposed bone. The midden was not concentrated. Several pipi shells had small pressure flakes removed from one side and are likely to have been used as scrapers. Five flakes of obsidian and one of chert were also present, none of which had use-wear.

Three pieces of worked moa bone were also recovered from Layer 2. One piece (Fig. 20) had a cut mark and evidence of a chisel scar at one end, indicating the method used to break the bone.

One posthole and two firescoops were dug from the Layer 2 level (Fig. 5). The posthole was 130 mm in diameter and approximately 250 mm deep. A possible posthole with a diameter of 200 mm was also present but the base and sides of the hole were not clearly defined. One firescoop contained a dense black charcoal deposit, burnt stones and mussel shells filled with white sand, and was dug from within Layer 2. The other firescoop was evident in section (Layer 2a on Fig. 4).

The shell midden (Layer 2) rested on a light grey sand (Layer 3) the colour of which is probably attributable to water percolating through the charcoal and staining the underlying sand. This layer was culturally sterile. Layers 4 and 6 were also sterile white beach sand separated by a thin cultural horizon (Layer 5) which consisted of mussel shells, coprolites and the occasional piece of charcoal.

Square 3. At first a 2 x 2 m square was placed over what was interpreted as the eroding edge of the cultural material but the square was extended into the intact dune when it was found much of the initial area was disturbed. In the Square 3 extension, connected

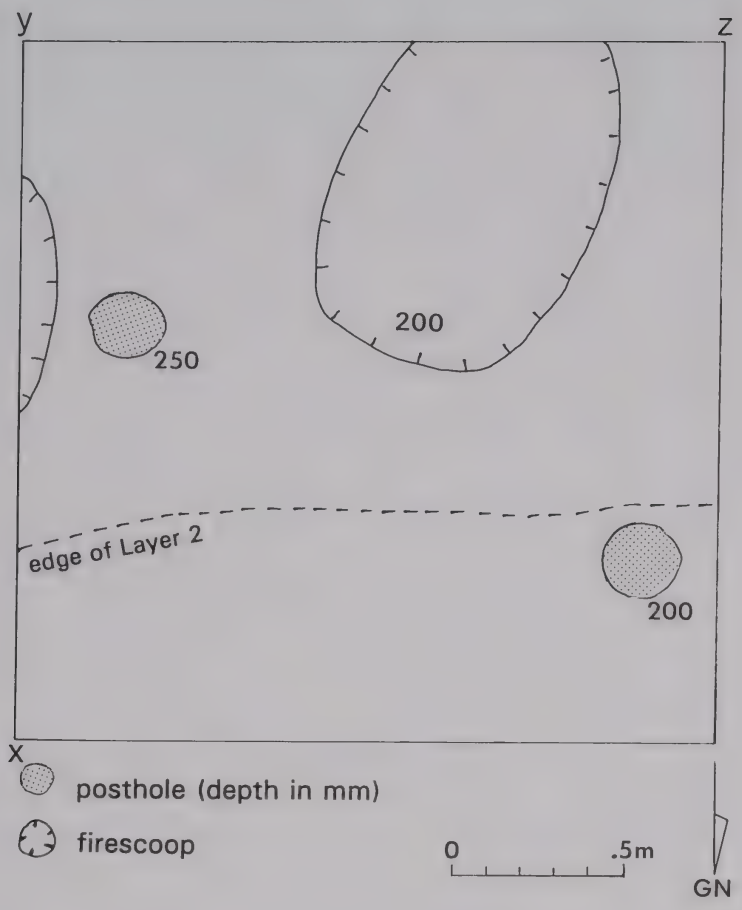


Fig. 5. T12/16, Square 2 features, Layer 2.

to Square 3 by a 3 x 1 m trench, intact cultural layers were found under redeposited material. The stratigraphic section is illustrated in Fig. 6; layer descriptions are as follows.

Layer 3 consists of a mix of sand, silt and loam with lumps of clay 50-200 mm thick, and is most likely related to the earthworks associated with the 1974 subdivision. Therefore Layer 2, which contained sparse cultural material, was redeposited, possibly during construction of the nearby toilet block.

Several occupation levels are evident in the underlying layers, each separated by sterile sand. Two occupations were excavated in plan, and the earliest cultural layer (Layer 11) was exposed in a test-pit. Unfortunately lack of time prevented this layer from being further investigated.

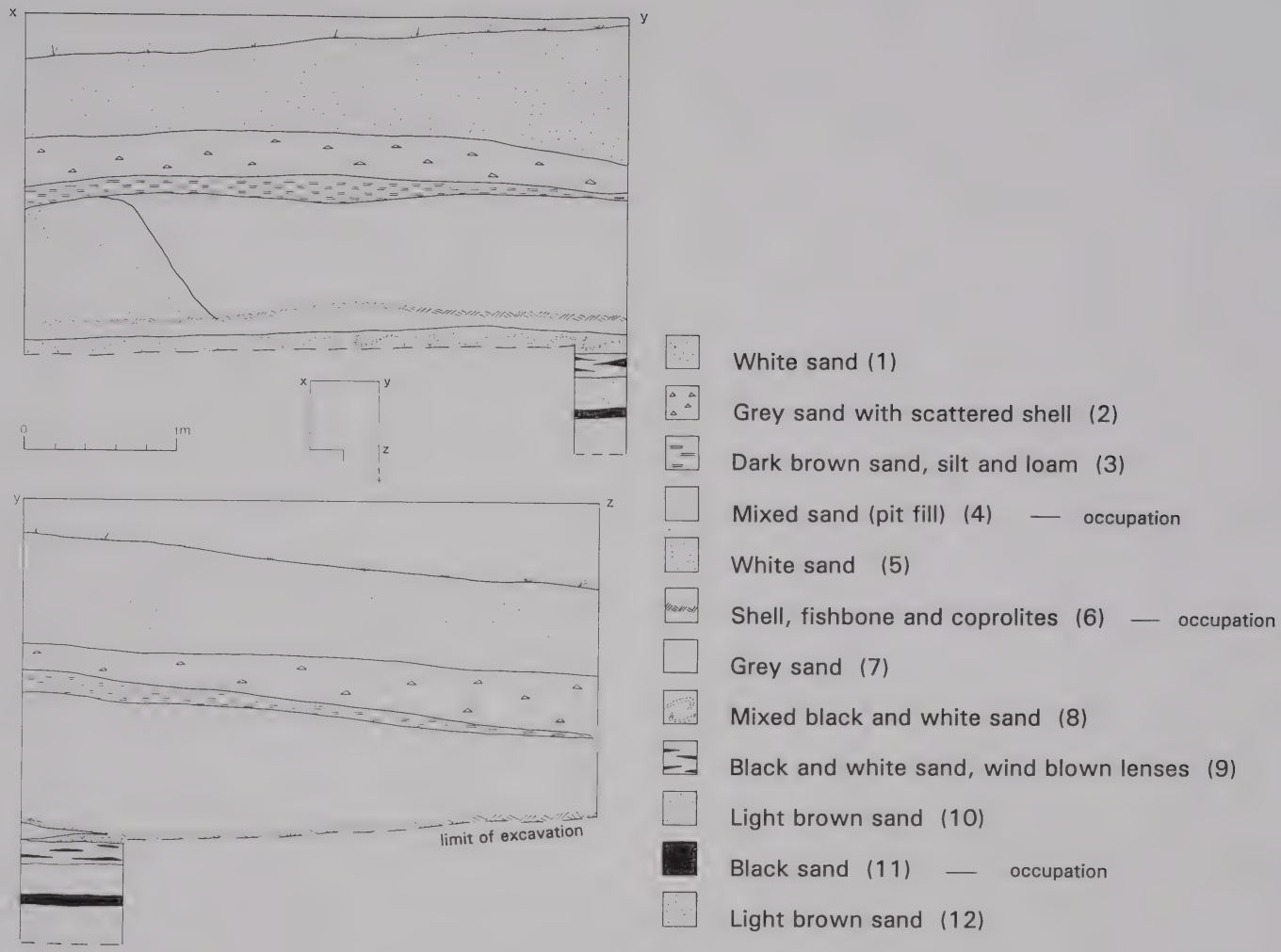


Fig. 6. T12/16, Square 3ext., stratigraphy.

The upper occupation level was characterised by a pit dug into light brown sand (Layer 5). The pit fill (Layer 4) consisted of very mixed sand with charcoal fragments included, and varied from white and light brown to black in colour. Several artefacts, including a small argillite chisel (Fig. 15), part of a one-piece bone fishhook, a piece of worked bone, two obsidian flakes, a small piece of kokowai and a lump of white clay were recovered. Into the upper level of the pit fill were cut two firescoops, overlapping but at different levels (see Fig. 7). The upper firescoop was 150 mm deep and contained black sand, ash, and fragments of charcoal with scattered shells of pipi and cat's eye. The earlier scoop, 120 mm deep, was filled with black sand with a concentrated area of charcoal in the centre.

The eastern wall of the 800 mm deep pit ran diagonally across the square. The pit size was not established, nor the place at which it intersected the western baulk of the associated trench, as the surface layers only were removed from this area. The pit must exceed 2.5 m in length on the north-west/south-east axis.

Four postholes were excavated outside the pit on the eastern side of the square (Fig. 8). It was not clear whether they related to the period of pit use, or to the later use of the area, evident from the firescoops.

The second clear occupation in this area is represented by Layer 6, consisting of a thin layer of mussel shells, charcoal, fish bone and coprolites. This layer represented the base of the pit but also extended under the pit wall. The mussel shells and coprolites formed a distinctive and easily recognisable layer evident in all squares across the site.

Layer 7, a grey charcoal stained sand, suggests some fire or cooking related activity in the vicinity although no evidence for it was found in this square. Similarly the mottled black and white sand of Layer 8 suggests human activity.

Layers 9 and 10 represent natural build-up, suggesting a period of abandonment. Layer 11 was a black charcoal rich layer, 50 mm thick, sitting on sterile light brown sand, and is the earliest occupation in this part of the site. This layer was not evident in squares to the east.

Squares 4 and 5. These adjacent squares were placed to investigate a dark coloured cultural horizon evident beneath loose sand overburden. Stratigraphy in both squares was very similar (see Fig. 9). Three separate occupations are represented, two of which indicate food preparation, cooking and waste disposal.

Layers 1 and 1a, loose dune sand and a thin silty sand respectively, are recent depositions, with Layer 1a dated to the 1974 subdivision construction.

Layer 2 was a shell midden in a matrix of charcoal stained sand with firescoops and fire rake-out indicated by Layer 2a. Shell midden in Layer 2 consisted of crushed and whole shells (some lensing evident) of a number of species of shellfish from a range of environmental situations (Table 2). Fish bones, a fragment of dog bone, coprolites and burnt stones were also present. Pipi shell scrapers, a fishhook fragment, part of a fishhook blank, two sandstone files, a bone chisel, obsidian flakes and worked moa bone were recovered from the midden during sieving.

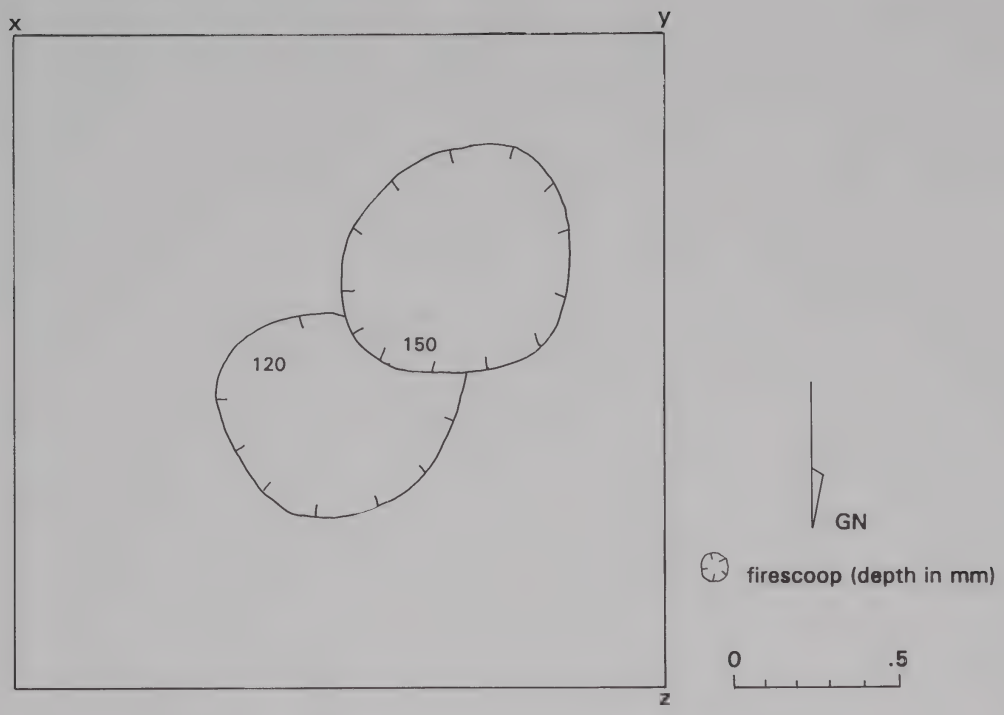


Fig. 7. T12/16, Square 3ext. features, Layer 3.

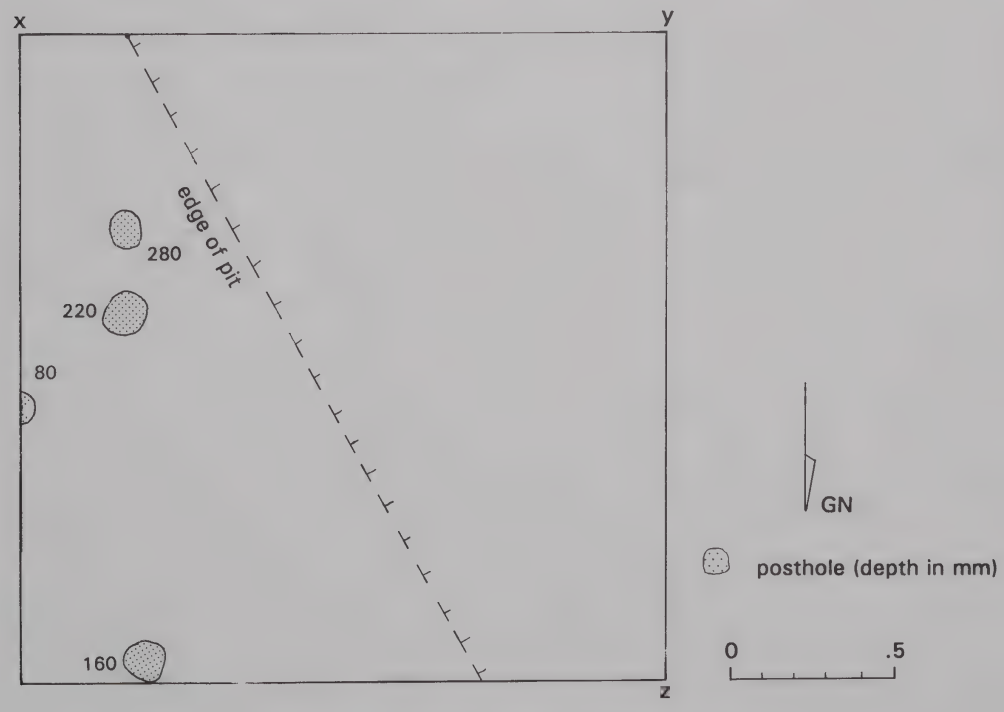


Fig. 8. T12/16, Square 3ext. features, Layer 4.

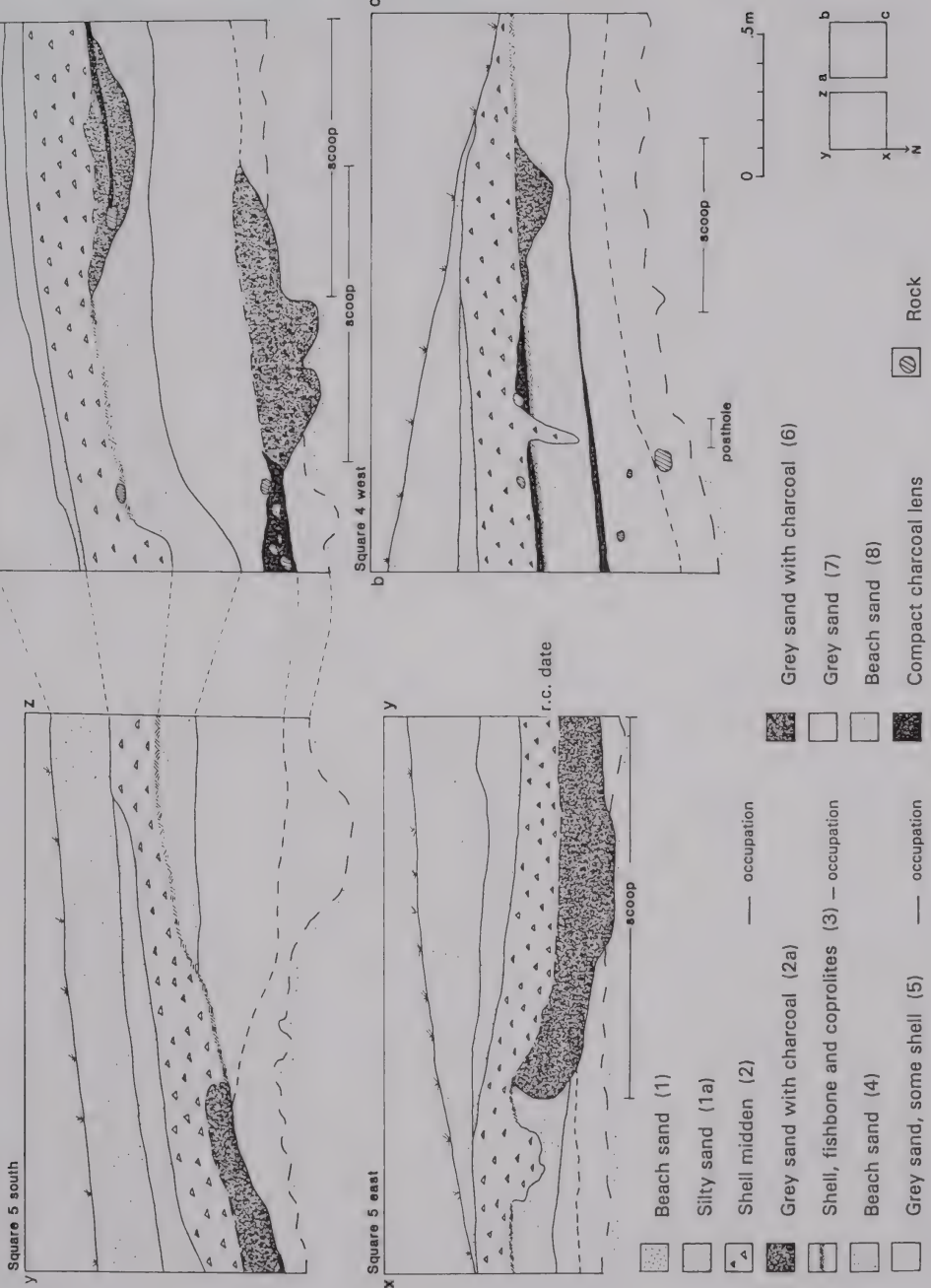


Fig. 9. T12/16, Squares 4 and 5, stratigraphy.

Six firescoops occurred within Layer 2 in Square 4 (Fig. 10). Four were less than 500 mm diameter, while the largest was in excess of 1 m. Three firescoops were present in Square 5, two over 1 m in diameter, the scoops occurring at differing levels within Layer 2. The contents of the scoops were similar with crushed midden, fire blackened stones and a basal lens of greasy charcoal stained sand. In Square 4, three postholes were found dug from within Layer 2 into the underlying layers. One posthole was present in Square 5.

Layer 3 in both squares was a thin layer of mussel shell, fish bone and dog coprolites overlying sterile white sand (Layer 4). The shell and coprolite layer was absent where it had been cut by firescoops at the base of Layer 2.

Layer 5 was dark grey stained sand with charcoal fragments, probably originating from Layer 6 which contained several firescoops — three in Square 5, and one in Square 4 (Fig. 11). Midden was sparse and consisted of mussel and cat's eye shells, fish bone and obsidian and basalt flakes. A fire blackened basalt adze roughout was present in Square 5, Layer 5, and a fragment of moa bone in Square 4, Layer 5.

Layer 7 was grey sand, stained from water percolating through the charcoal in the layer above. No cultural material was found. Layer 8 was white beach sand.

The evidence from Squares 4 and 5 is consistent with food preparation and cooking in the earliest and latest occupations, with midden dumping also occurring in the later occupation. The build-up of charcoal rich sand and shell layers can be attributed to fire rake-out.

As in the other excavated squares, Layer 3, representing the middle occupation, was very uniform with mussel shells and dog coprolites on white sterile sand. Dogs apparently also scavenged over the midden waste as coprolites were found in Layer 2.

Squares 7 and 8. Squares 7 and 8 were excavated in 1988 to define occupation surfaces in the unexcavated area between Square 2 and Squares 4 and 5 (Fig. 3), and to obtain more shell from the earliest occupation layer for radiocarbon dating.

Cultural layers were more numerous than in other squares excavated, but the evidence fits in with a three-phase occupation. The amount of shell midden indicates this was more of a dumping than a cooking area, unlike Squares 4 and 5. The following description of the stratigraphy refers to Fig. 12.

The cultural layers were sealed by loose beach sand (Layer 1) and a brown sandy loam (Layer 1a) containing shell and unmodified cobbles of obsidian which are to be found through the clay subsoil in this area.

Layer 2 was shell midden, similar in appearance to that found in Squares 2, 4 and 5. The shell was very crushed and burnt. Species present were mussel and paua in abundance, with *Cellana radians* (limpet), pipi, *Cookia sulcata* (Cook's turban), cat's eye, *Cominella*, *Thais orbita* and cockle also present. Lenses of individual species were evident. Oven stones and charcoal pieces were also present. Fragile and fragmented bone occurred throughout but was too decomposed for recovery. As all the pieces

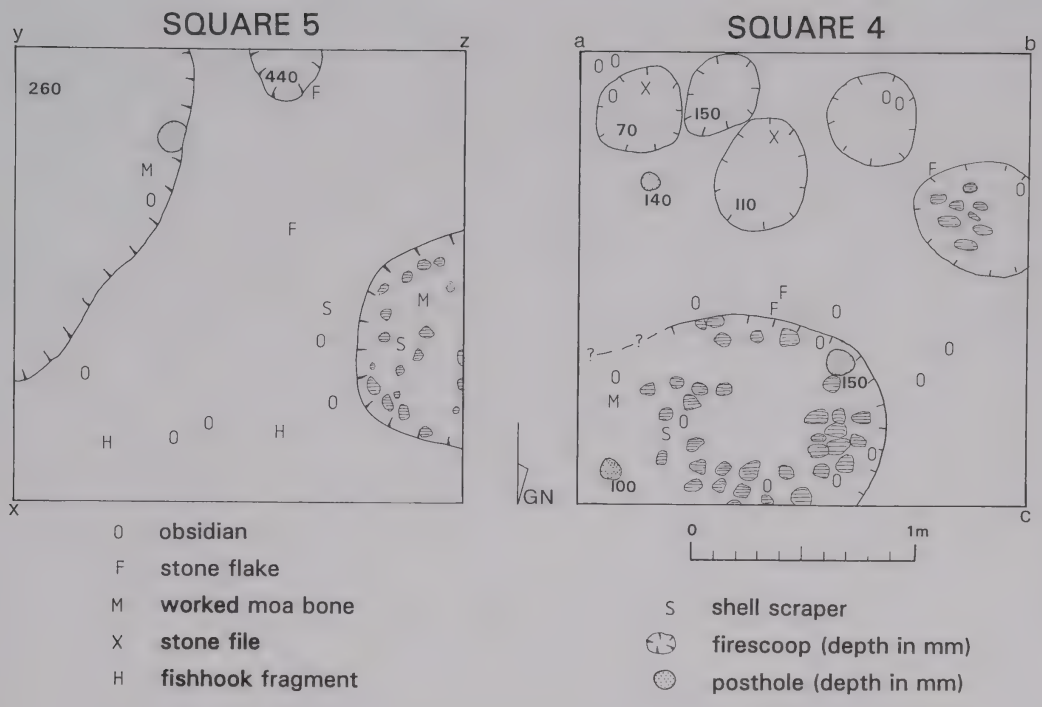


Fig. 10. T12/16, Squares 4 and 5 features and artefact locations, Layer 2.

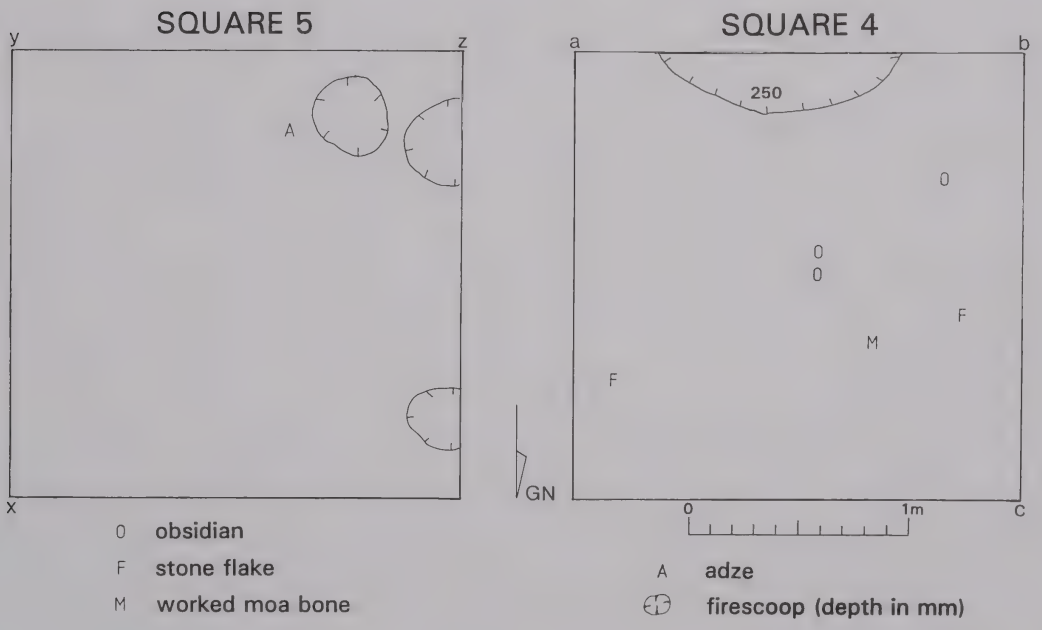


Fig. 11. T12/16, Squares 4 and 5 features and artefact locations, Layer 5.

were small, it is likely to have been fish bone. Layer 2a was a greyish black stained sand containing sparse shell, consisting mainly of pipi, and appears to be a fire rake-out. One firescoop containing charcoal, ovenstones and black sand was dug from Layer 2a in Square 7.

Layers 3, 5 and 7 were sterile white sand, with Layer 6, a distinctive mussel shell layer, separating Layers 5 and 7.

Layer 4, present only in Square 7, was a very concentrated fragmented midden, up to 100 mm deep, consisting mainly of mussel shells, with very small quantities of other species such as pipi and cat's eye, and one *Cellana denticulata*. Coprolites and fish bone were also present. This layer was cut into by a firescoop originating from Layer 2a.

Layer 8, equating with Layer 5 in Squares 4 and 5, consisted of black sand with sparse shells and lenses of concentrated charcoal (see Table 2 for the midden analysis from this layer). A posthole visible in the Square 8 section (Fig. 12), originated from this layer. Fingers of Layer 8, interlaced with sterile sand called Layers 7 and 9, occur in Square 7. Layer 10, similar to Layer 6 in Squares 4 and 5, consisted of dark grey stained sand and charcoal lenses, resting on sterile sand (Layer 11).

Square 6. At the southern end of the site (Fig. 3) surface evidence indicated a large concentration of flaked stone material and bone. The intention with Square 6 was to investigate the depth of occupation at what appeared to be the periphery of the site. A trench 7 x 1 m was laid out through the exposed cultural layer and back into the dunes and two 1 x 1 m squares (Areas A and B) were excavated. Square 6B stratigraphy was as follows (see Fig. 13).

Layer 1 was modern dune sand with a small charcoal lens (Layer 1a) within it. Layer 2 consisted of a thin lens of dark brown sandy loam with some pebbles scattered throughout. This is likely to have originated during the construction of the tennis court above the site.

Layer 3 was a light brown coloured sand up to 150 mm thick with charcoal and some shell. Fish bone and a fragment of dog bone were also present.

Layer 4 was similar to Layer 3 but contained more charcoal and large shells of pipi, cockle, cook's turban, cat's eye and mussel. Analysis of midden samples is shown in Table 2. Fish bone identifications are presented in Table 3. A concentration of fire blackened stones and *in situ* charcoal, interpreted as a hearth, were situated at the base of the layer. This layer rested on clean beach sand.

The occupation surface appeared to be level and extended under the dune overburden. Because of the distance from the remainder of the excavations it is not possible to stratigraphically tie the occupation evidence from Square 6 with the rest of the site.

Layer 3, with a large amount of organic matter, could possibly be interpreted as a paleosol although the quantity of shell and charcoal mixed throughout suggests it

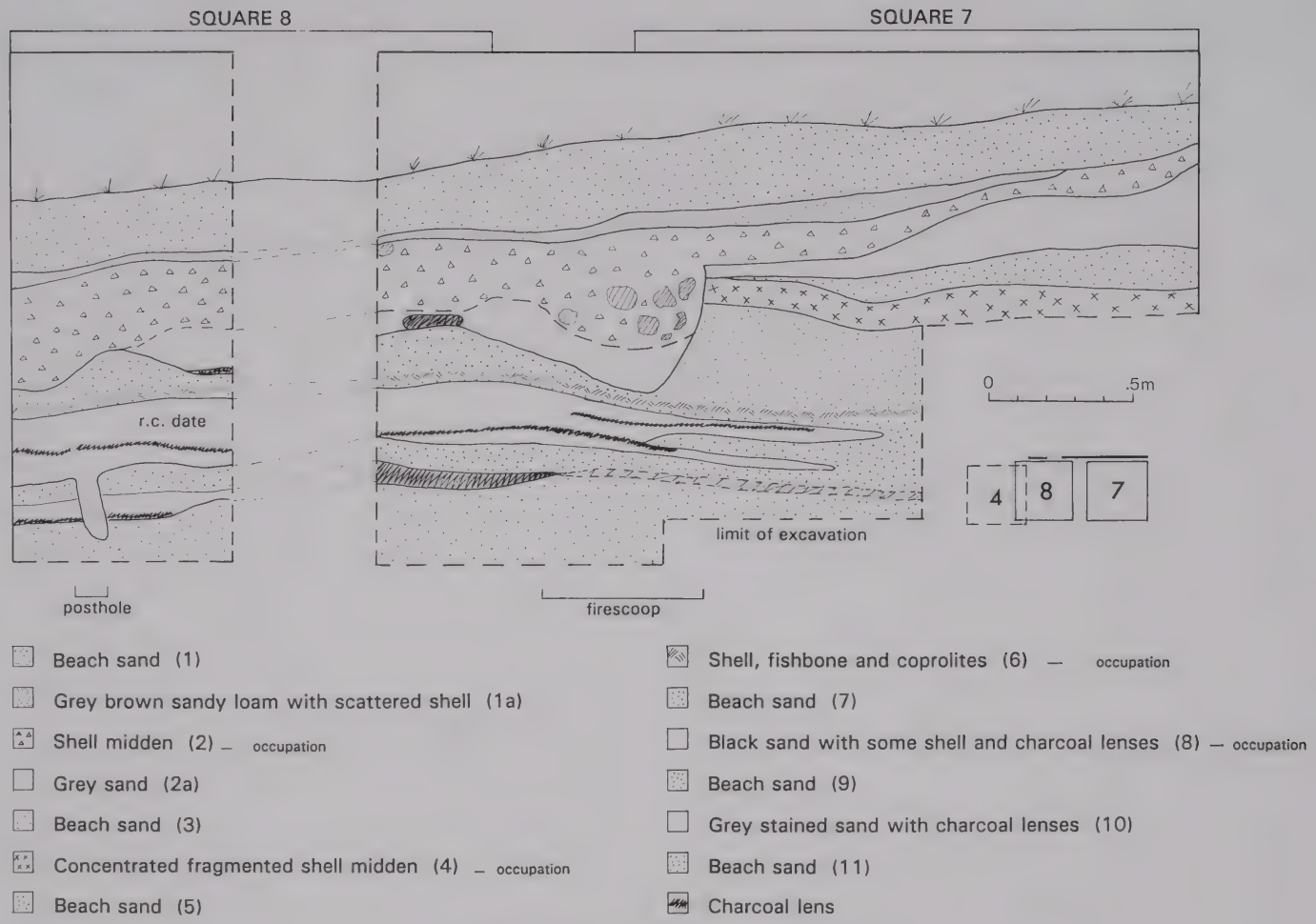


Fig. 12. T12/16, Squares 7 and 8, stratigraphy.

was not *in situ*. Square 6A, located near the eroding edge of the dune, had the same loamy sand under the midden layer, minus the shells and charcoal. This is interpreted as an *in situ* paleosol.

STRATIGRAPHY AND OCCUPATION SEQUENCE

Three separate periods of activity, separated by sterile sand layers, can be identified. Stratigraphy was fairly uniform across the squares excavated and occupation layers were readily identified (Fig. 14). Evidence of the first occupation level (I) is present at the eastern end of the excavations while occupation levels II and III occur in all squares with the exception of Square 3 where the last occupation is missing, presumably removed during recontouring work associated with construction of the beach subdivision.

Occupation I. The first occupation level occurred at the eastern end of the site (Squares 4, 5, 7 and 8) and consisted of sparse shell midden in a dark grey sand matrix, with associated firescoops and postholes (Figs. 5 and 6). The layer was fading out in Square 7. The underlying sand was also stained dark grey from water leaching through charcoal lenses within the occupation layer. An adze roughout, worked moa bone, and flakes of basalt and obsidian were recovered. Shellfish species represented various marine environments with preferences indicated for mussel and cat's eye. Fragmented fish bone was also present.

Square 3 had evidence of at least one occupation level below Occupation II, but this cannot be linked up stratigraphically with the earlier level in Squares 4, 5, 7 and 8. The lensing out in Square 7 and the apparent absence of layers relating to Occupation I in Square 2 suggests that cultural material in Square 3, evident only in a test pit, may be assigned to a different event.

Pipi shells from Square 8, Layer 8, were submitted to the Universityof Waikato Radiocarbon Dating Laboratory. An age estimate of 690 ± 50 BP (WK 1515, new half life, reservoir corrected) was obtained.

Occupation II. This was characterised in all excavations, except Square 6, by a thin layer of mussel shells, fish bone and coprolites within sterile white sand. No features were associated with it. The absence of cooking evidence or other more substantial build-up suggests this part of the site was at the edge of the main settlement.

Occupation III. The upper occupation is characterised by midden containing a large number of shellfish species from open coast, rocky shore and estuary (Table 2). Mussel was again the dominant species. Fish bone was also present but was in a fragmentary and decomposed state, making collection and identification difficult. Firescoops and a posthole occurred, and in Square 3 a feature interpreted as a pit can also possibly be assigned to this occupation (Fig. 8).

Artefacts included obsidian flakes, two file fragments, fishhook fragments, a bone chisel and worked moa bone. Pipi shells with edge damage were also present. A chisel in the fill of the pit feature in Square 3 cannot positively be assigned to this occupation level as the fill may have been redeposited from elsewhere on the site.

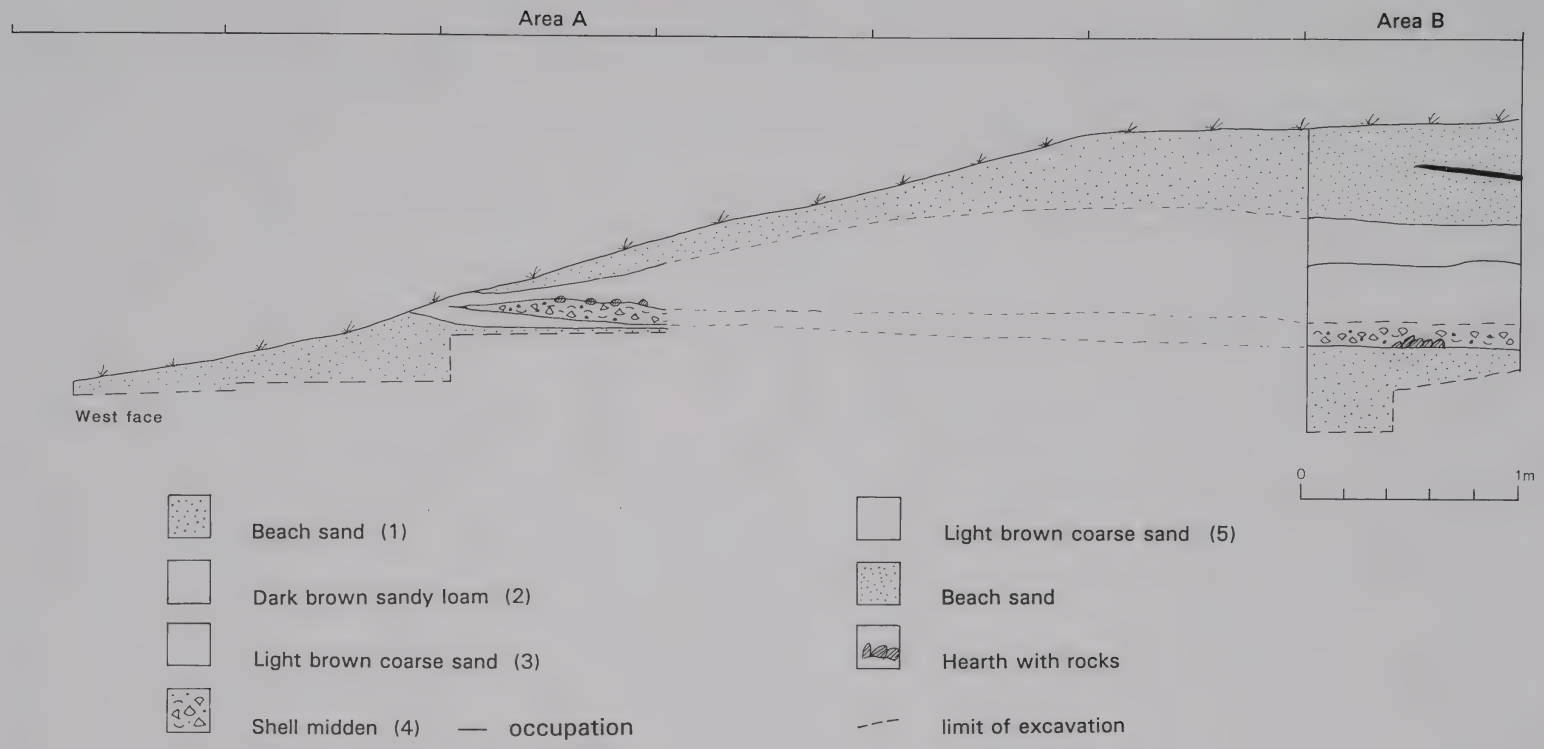


Fig. 13. T12/16, Square 6, stratigraphy.

This occupation occurred in Squares 2, 4, 5, 7 and 8. An underlying grey sand layer, representing charcoal staining from the firescoops was also present. The midden layer was absent in Square 3 but the pit was in a stratigraphically correct position to be assigned to this occupation. Two firescoops were dug into the surface of the pit fill and had been overlain by the subdivision spoil. A midden layer occurred above this, and although similar to Layer 2 must have been redeposited after 1974 (Fig. 6).

Only one side of the pit was found, dug into sterile sand. The base of the pit was above the mussel shell layer which characterised Occupation II. Four postholes were present on the eastern side of the square but the angle of the line indicates they did not support a roof structure over the pit.

An age estimate of 560 ± 45 BP (WK 1169, new half life, reservoir corrected) for this occupation was obtained on cockle shells from Square 5, Layer 2.

STONE MATERIAL

Obsidian, basalt and chert were recovered. Obsidian was more abundant than the other two stone types. Squares 4, 5 and 8 had the greatest concentration of material.

Obsidian

A total of 92 obsidian pieces were excavated, 63 from Layer 2. The majority were waste flakes (89%), nearly all under 40 mm in length, although very small flakes or chips were not represented even in sieved samples. This suggests flaking occurred elsewhere on the site and waste material was thrown into the midden area. The very low concentration of stone material is another argument against flaking having occurred *in situ*.

Squares 4, 5 and 8 had the highest concentration of obsidian flakes in Occupation III. By comparison, few flakes were found in Occupation I (Table 1).

Table 1. Obsidian flake distribution by square and occupation layer.

Square	1	2	3	4	5	7	8	6	%
Occupation III		5		24	17	4	14		69
Occupation I				2		4	4		11
Undetermined	8		4					6	19

Grey, grey-brown, green and a milky grey-green obsidian were identified in transmitted light. Following Moore (1988:12, 16) the most likely source for the grey and grey-brown obsidians is Whangamata, including Onemana, although they are also similar to obsidian from Ben Lomond in the central North Island (Moore pers. comm.). Clearly a local source is most likely. Green obsidian is most likely derived from Mayor Island. A milky grey-green flake is probably also from Mayor Island despite its unusual colour. None of the flakes matched samples from the Waihi source (Moore, pers. comm.).

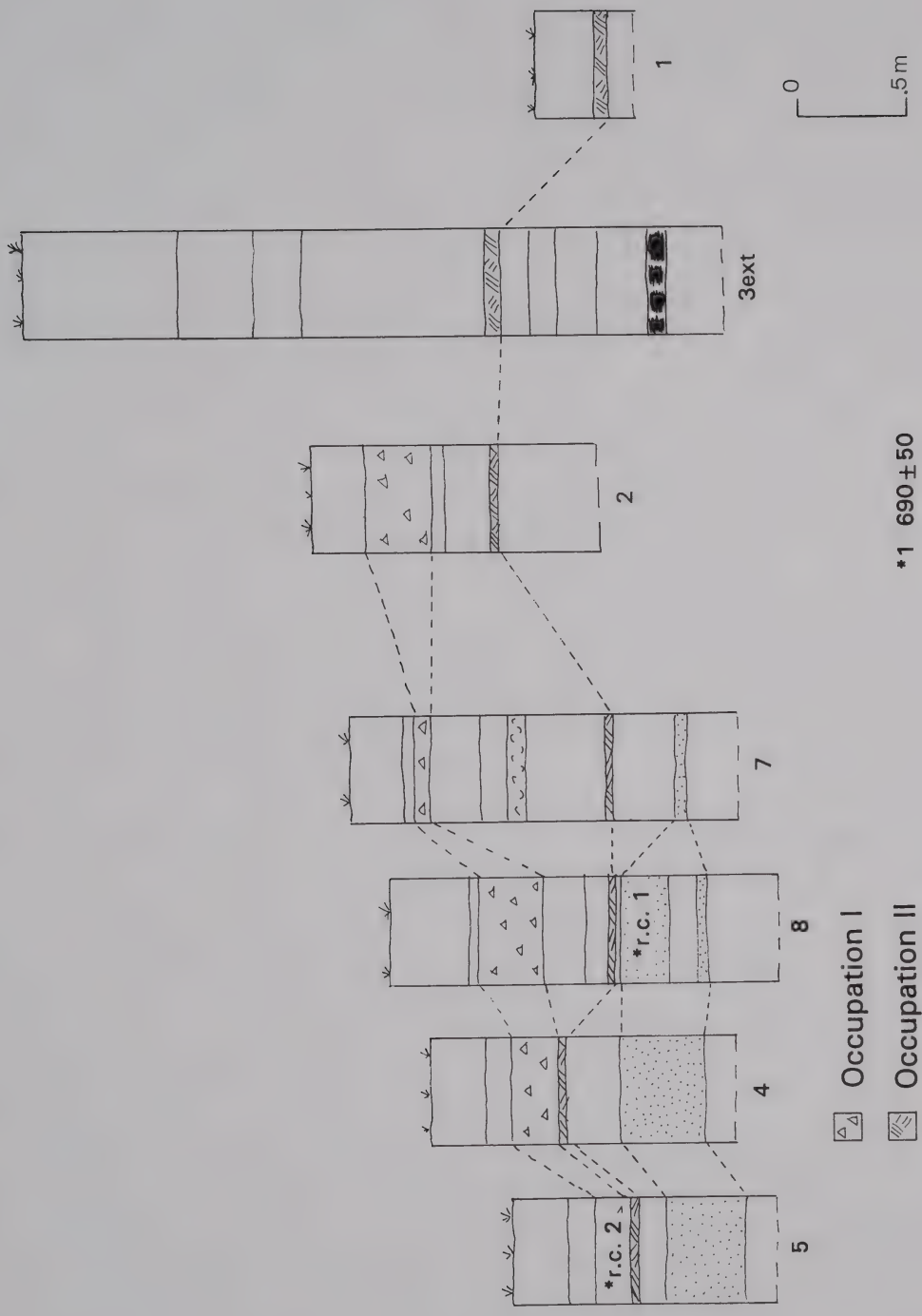


Fig. 14. T12/16, generalised composite stratigraphic sequence across excavated area.

Grey obsidian provisionally sourced to the Whangamata area accounted for 87% of the flakes from Occupation III and all from Occupation I. This accounted for 89% of the total assemblage. Ninety per cent of grey flakes had cortex present, curved cortex surfaces suggesting the cobbles were relatively small, perhaps fist-sized or less, which fits with the size range of the obsidian found naturally in the area.

The high proportion of what is in all probability local obsidian does not fit the pattern evident in other early sites, even when a source is adjacent to a site (for example, Whangamata Wharf Site, Allo 1972:66; and Harataonga, Law 1972:92). Indeed, the preference for Mayor Island obsidian has often been taken as an indicator of an early age (Green 1964:134-143). One suggestion to account for the high proportion of local obsidian at Whitipirorua, and which will be explored in more detail later, is that the presence of local stone materials in a site may be an indicator of the type of settlement and the duration of occupation. The exploration of the local area to find, and use, suitable stone implies a base camp or village situation, whereas importation of obsidian from another area suggests people primarily engaged in other activities such as hunting, and not making full use of local resources because of the short period of occupation.

Other stone

Twenty-two pieces of other stone were recovered. Basalt flakes accounted for 41%, chert 54% and quartz 5%. The distribution was similar to that of the obsidian: Squares 4, 5, 7 and 8 had 73% of the basalt, chert and quartz.

Chert was generally of poor quality, flaking in an irregular fashion. All pieces had cortex. It is likely that all chert originated in the local area. One piece, with a crystalline sugary cortex, is similar to material from chert outcrops on the central ridge of the Whitipirorua Peninsula (J. Coster and P. Moore pers. comm.). There is a chert outcrop on the beach below T12/21 and chert pebbles with a water-rolled outer surface also occur on the beach.

Included in the basalt count was one polished adze flake and a flake identified as having been used as a spokeshave. Use polish is present where the tool is likely to have been held. The curved 'bite' in the flake had a diameter of 5 mm. One other piece has use polish or patina on the ridges of flake scars on one side and has a straight edge 15.5 mm long which may have been used as a scraper or chisel.

MIDDEN ANALYSIS

Shell

Shell samples were collected from Squares 4, 7, 8 and 6, representing all three occupation levels. In each case a 500 mm quadrant of the layer was bagged for analysis. The samples were sorted and minimum numbers obtained on all species present. The results are shown in Table 2.

Table 2. Shell midden analysis, T12/16, Whitipirorua.

Square	4	7	8	6
Layer	2	4	8	5
Occupation	III	II	I	
Rocky shore				
Perna canaliculus	202	35	11	168
Turbo smaragdus	31		10	23
Cellana radians	3		3	6
Haliotis sp.	3			1
Thais orbita	2		1	4
Nerita (Melanerita) atramentosa melanotrogus	2		3	4
Cookia sulcata				3
Xymene ambiguus	2			
Maoricrypta costata	9			6
Crassostrea glomerata	2			10
Sandy shore				
Paphies (Mesodesma) subtriangulata subtriangulata	6			28
Dosinia sp.	1			
Tawera sp.	1			
Umbonium (Zethalia) zelandicum	10			1
Divaricella (Divalucina) huttoniana			2	
Pecten novaezelandiae			1	
Estuary				
Chione stutchburyi	47		1	70
Paphies australis	38		3	40
Amphibola crenata	14			6
Cominella sp.	4			4

The dominant shellfish species in all squares was *Perna canaliculus* (mussel). This was particularly apparent during Occupation II where mussel was the only species present, demonstrating a highly selective gathering practice.

In other occupations a range of species was collected from the rocky shore and also from a soft shore or estuarine environment. Onemana Beach has an extensive rocky coastline to the north and south, with potential for large mussel beds. The nearest sources of estuarine shellfish are Whangamata Harbour, on the western side of the Whitipirorua Peninsula, and Wharekawa Harbour to the north (Fig. 1). Sandy shore species are poorly represented which may be explained either by selective gathering or by species such as *Paphies subtriangulata* (tuatua) being locally scarce during the early period of settlement. Interestingly tuatua were a minor species at the Whangamata Wharf site although the shellfish are common on the beaches in the area today (Allo 1972:71). In contrast to many early sites, shells of all species were not particularly large, perhaps reflecting that the environment had previously been harvested.

Fish bone analysis

A preliminary analysis of fish bone from Squares 1, 4, 5 and 6 has been carried out. Actual numbers of individuals in each species have not been ascertained because of small sample sizes. Results are presented in Table 3. *Chrysophrys auratus* (snapper) was the dominant species in each square and layer, a predictable result for a midden of an early age.

Squares 4 and 5 had a very restricted range of species with snapper and *Pseudolabrus* sp. (labrid) present. Square 1, in all layers, had a large number of species and individuals. Snapper, labrid, *Arripis trutta* (kahawai), *Parapercis colias* (blue cod), stargazer and other unidentified species were caught. Square 6 had a wider range of species and larger number of individuals. Reg. Nichol (pers. comm.) suggested that the presence of pelagic fish species such as *Trachurus declivis* (jack mackerel), *Scomber australasicus* (blue mackerel) and *Thyrsites atun* (barracouta), and a generally wider range of species in Square 6 suggests a 'late' date. This is not supported by the other archaeological evidence but neither does it confirm the contradictory view of an early date.

Many of the fish species could have been caught close to the site, particularly from the rocky coastline. Barracouta and the mackerel species would have been trolled further off-shore in deeper water.

Table 3. Fish species by square and layer, T12/16.

	Square 1			Squares 4 & 5			Square 6		
	S	L1	L3	L2	L3	L4	S	L3	L4
Zeus faber									x
Chelodonichthys kumu								+	x
Trachurus declivis									x
Arripis trutta		x	x					x	?
Chrysophrys auratus	*	*	*	*	*	+	+	*	*
Aldrichetta forsteri							x	x	+
Pseudolabrus sp.		+	+	x		x			+
Parapercis colias		x	x						
Thyrsites atun								x	x
Scomber australasicus								x	
Parika scaber								+	
Latridopsis ciliaris				x				x	
?Stargazer			x						
Spiny dogfish								x	
Other	x		+	x			x	+	*

x = present; + = more than 1 individual; * = several
S = surface

A variety of capture techniques would have been necessary. Most species of inshore fish could have been taken by bait hook or net while the pelagic fish would have needed trolling hooks and lures. Bait hooks of varying sizes are represented from the

site, as are trolling shanks and hooks (Furey 1990). Evidence of nets and traps rarely survive archaeologically.

The species list is similar to that from other Coromandel Archaic sites, although minimum numbers of each species is small. However this is misleading as it represents only the bone able to be recovered and identified. Much of the fish bone, especially from Occupation II, was in a fragile and poorly preserved condition.

Other bone

Very little bird and mammal bone was present in the middens. Two *Eudyptula minor* (blue penguin), from Occupation III in Square 2 and Square 7/8 baulk, one *Puffinus assimilis* (little shearwater) from Square 4 Layer 4, and one *Puffinus griseus* (sooty shearwater) from the surface of Square 7 were identified. Fragments of moa bone from the surface of Square 7 were also present.

Canis familiaris (dog) was identified by vertebrae, mandible and cranial fragments from Squares 4 and 6. A minimum of two dogs is represented. A phalange of *Arctocephalus forsteri* (fur seal) from Square 2 Layer 2, and a cranial fragment from either a fur seal or *Phocarctus hookeri* (sea lion) was in Square 5 Layer 2 which, together with unspeciated fragments of sea mammal from Square 4 Layer 2, can be assigned to Occupation III.

Cetacean bone was present in Square 3 extension and in Squares 7 and 8.

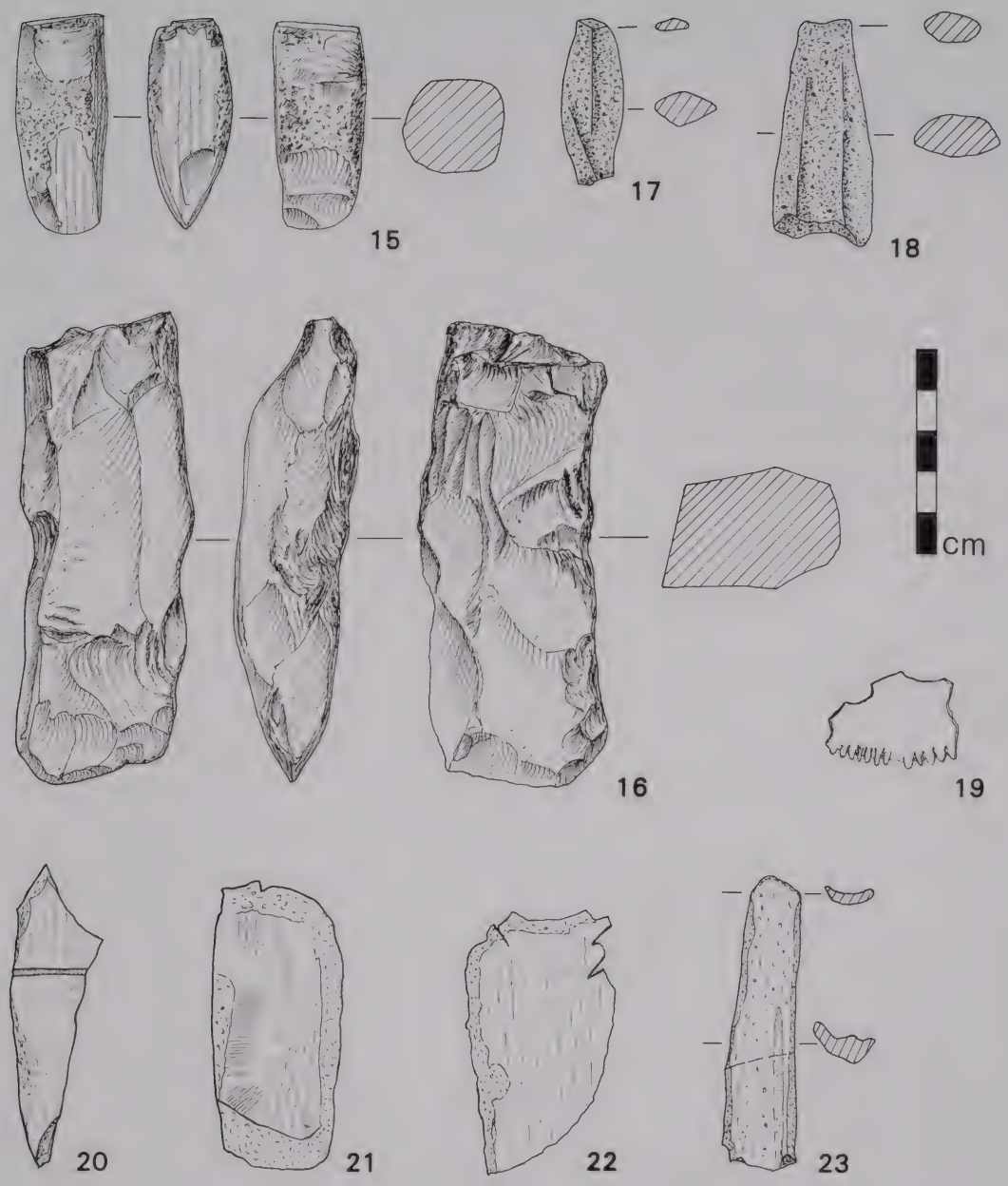
All of the bone was fragmented, perhaps reflecting scavenging by dogs. No bone was recovered from the lowest occupation level (I).

ARTEFACTS

Few artefacts, either finished or in the process of manufacture, were recovered. One argillite chisel, a basalt roughout, several fishhook fragments, a piece of worked paua shell, two stone files, a bone chisel, eight pieces of *Dentalium* shell and several pieces of worked bone make up the assemblage. All material is now in the Auckland Museum.

The chisel, Auckland Museum catalogue number AR7741 (Fig. 15), made from metasomatised argillite, was recovered from the fill of the pit in Square 3. Rounded in cross-section, it most closely resembles Duff's Type 6 gouge. Polish occurs on one side and on the back near the blade, with less on the front, also near the blade. Hammer-dressing also occurs on the front and back and on one side. Flake scars and an irregular blade indicate considerable damage which made the chisel unusable in its present form. The blade width is approximately 13mm. The chisel is unique in the wider collection of artefacts from the site in respect of both material and shape. All the adzes from the site held in the Auckland Museum are of basalt and tend to have rectangular or irregular cross-sections (Furey 1990).

The basalt adze roughout AR7745 (Fig. 16) was found in Square 5, Layer 4. Flaked all over, the roughout has polish on front and back and a small amount on one side. The cross-section is quadrangular with the back slightly narrower than the front.



Figs. 15-23. T12/16, excavated artefacts. Adzes. 15. AR7741. 16. AR7745. Sandstone files. 17. AR7742. 18. AR7743. Worked shell. 19. AR7737. Worked bone, moa. 20. AR7738/1. 21. AR7738/2. Worked bone, whale. 22. AR7740. Bone chisel. 23. AR8327.

The blade is flaked and irregular, with hammer-dressing scars on one edge probably the result of trying to reduce the blade width in this area. The plane of the adze is skewed to one side. Cortex is present on the back although this is very weathered and has considerable use-polish or patina on it.

Two sandstone file fragments were recovered from Square 4 Layer 2 (Figs 17, 18). One is rounded rectangular in cross-section, the other is roughly diamond shaped. The tips of both are missing.

An unusual artefact is made from paua shell (*Haliotis* sp.) with notching along one side (Fig. 19). This piece (AR7737) is only a fragment although grinding along one edge indicates it is an end portion. The rough cortex of the paua is present on the reverse side but it has been ground down in the vicinity of the notches or 'teeth' in the same manner as was the notched paua pendant from Sarah's Gully (Davidson 1986:224). The artefact was found in loose surface sand in Square 1 and can probably be assigned to a period earlier than Occupation II. Several similar pieces in the Auckland Museum were surface collected in recent years close to Square 1 (see Furey 1990:36).

Eight units of *Dentalium nanum*, varying in length between 11-14 mm, were found in a 500 mm quadrant in Square 1, Layer 3, equating with the same level from which the notched paua shell artefact originated. All the units are from the straight lower end of the *Dentalium* shell, suggesting the sections have been cut or snapped for threading.

Fishing gear was represented by a burnt fragment of a one-piece bone hook (possibly ivory), AR8328, and a fragment of a bone fishhook blank, AR7739/2, both from Square 5 Layer 2, and the shank limb of a one-piece bone fishhook, AR7739/1, from Square 3, Layer 4. The head has a notch cut on either side for line lashing, similar to most hooks from the site in the Auckland Museum collection (Furey 1990:29).

Three pieces of worked bone were also recovered from Layer 2. This took the form of fractured bone with cut marks, ground surfaces and chiselling. Two pieces were moa (AR7738/1, AR7738/2), the other was whale (AR7740) (Figs. 20-22).

Another piece of moa bone (AR8327; Fig. 23), very weathered and in two pieces, tapers to one end which is rounded in shape. Some working is evident on one edge at the rounded end. Rat gnawing grooves are present on the convex side. The artefact is reminiscent of moa bone chisels illustrated by Anderson (1989:156). This artefact type is not common, although examples are known from northern sites such as Houhora, and from Kaupokonui in Taranaki. None have been reported on Coromandel Archaic sites. These tools may have been used for dressing skins, although other domestic and industrial uses are also a possibility (Davidson 1984:74).

The remaining artefact type, found in Squares 2, 3, 4 and 5, was unmodified pipi shells with small chips removed from the long edge and on the curves at either end. Two shells were recovered from Square 3, ten from Square 2, six from Square 4 and four from Square 5. All came from Occupation III. Their presence in the midden suggests an activity related to food preparation. Harsant (1983:149-162) describes

shells being used for scraping vegetables and fernroot, fish scaling and cutting flesh, in addition to other activities such as scraping wood and bone. This type of artefact is not often recovered from sites, probably due to the lack of distinguishable features when present in a midden containing the same shellfish species.

DISCUSSION

Although only a small portion of a large site was excavated, evidence recovered adds to the body of information on Coromandel Archaic sites. This evidence will be discussed in relation to site layout, dating and economic information, with conjecture on how Whitipirorua fits into the sequence of early Coromandel east coast sites.

Features were excavated from two occupation layers separated by sterile sand. It is apparent there was an element of deliberation in the siting of features, and by association, activities. Squares 4 and 5 represent the cooking areas in Occupations I and III, while Squares 7 and 8 have the associated evidence of food remains, predominantly shellfish. By contrast, Square 3 had no food remains or cooking evidence but had postholes, and a pit of unknown function.

Occupation II, which occurred throughout excepting Square 6, is difficult to interpret as there were no features or stone material associated with it. In addition the sand was untrampled and unstained. A natural cause of the shell deposition could be ruled out by the presence of charcoal, dog coprolites and fish bone, and by the one shell species present. The number of dog coprolites suggest concentrated and perhaps contained scavenging in a midden area far removed from the cooking places, a conclusion which explains the lack of fire-related debris.

The superimposition of cooking areas from different occupations mirrors the pattern at the Cross Creek (Opito) site where cooking and tool manufacturing activities were separate. Sewell (1984:90-96) proposed that spatial relationships of particular activities at Cross Creek were governed by a cultural belief in tapu and noa where male oriented activities equating with tapu were placed at the western end of the site, and the opposing force of noa, equating with women's activities, and cooking, were directed to the eastern end of the site. This directional and activity related placement was repeated over several occupations spanning 200 years, suggesting cultural beliefs dictated site layout.

What little information is available from Jolly's excavations suggests that the selective placement of activities, as at Cross Creek, is not apparent. While there does appear to have been concentrated industrial activity (by inference male/tapu) in Jolly's 'Site 1' and 'Site 2', the samples recovered indicate that midden and cooking fires were also present although possibly not all from the same layer. It is clear, however, from the recent excavations, that during two separate occupations cooking was distanced from other activities. No evidence of *in situ* artefact manufacture was found in Squares 1-8.

Postholes and a pit in Square 3, with no food debris in direct association, suggests that this was a separate part of the settlement with a different range of activities. The lack of food debris here is important evidence, indicating the separation of cooking from what must be storage of some kind.

Pits have been found in several Coromandel dune sites, namely Hahei, Cross Creek, Hot Water Beach, N40/2 at Opito, and now Whitipirorua. The assumption in previous cases has been that the pits functioned as kumara stores but early historic accounts describe pits as having a variety of uses from housing fishing nets or implements to use as food stores. It can be assumed that these uses also occurred in the early period of settlement.

Archaeological sites excavated on the Coromandel Peninsula and elsewhere suggest that from the time of Polynesian colonisation there was a settlement system composed of different types of sites including base camps or hamlets, from which abundant local resources could be exploited and where a wide range of activities were carried out, and temporary camps set up for a particular purpose such as fishing or hunting (Davidson 1984:166-170). The position of Whitipirorua in the settlement pattern is not clear, partly because only a small area of the site has been excavated. However, several factors including the large size of the site, repeated occupations, internal differentiation of activities and the wide range of artefacts recovered (Furey 1990) encourage interpretation towards the base camp or village end of the settlement spectrum. The absence of large quantities of bone material may also show that the site was not a hunting camp of short duration where carcases were processed and unwanted body parts discarded.

Two radiocarbon dates, obtained on shell, are available. The earliest occupation in Square 8, Layer 8, has an age estimate, uncorrected for reservoir effect, of 990 $\pm$ 50 BP (WK1515) while the upper midden deposit (Square 4, Layer 2) in the same area has an uncorrected age estimate of 870 $\pm$ 45 BP (WK1169). Using the Stuiver, Pearson and Braziunas (1986) carbon cycle calibration curve, there is a 95% statistical confidence level that the dated occupations fell within the periods 1285-1437 AD and 1352-1521 AD respectively, with median age distributions of 1359 AD and 1444 AD. The range of artefacts, typically Archaic, also suggest the site was not occupied after the 16th century.

These dates fit comfortably within the Archaic sequence on the Coromandel Peninsula. The older falls into the earliest reliable end of the sequence, fitting between Occupations II and III at Cross Creek (Sewell 1986:228-9), and is possibly of similar age to the lower level at Sarah's Gully (Green 1963:66). The upper occupation equates with Occupation III at Cross Creek and the lower level (Layer 6) at Hot Water Beach (Leahy 1971:62-3). Tairua and both Hahei sites (T11/326 and 242) fit in between the Whitipirorua occupations.

However it must be remembered that the radiocarbon dates do overlap when taken to two standard deviations and that the occupation levels dated may have been deposited closer in time, or even within the same occupation event. Recent dating of over twenty samples from the deeply stratified site at Shag River Mouth in North Otago indicate that the more dates obtained, the narrower the time range became when the results were statistically pooled (Atholl Anderson pers. comm.).

The Whitipirorua site has a number of anomalies when compared to other Archaic sites on the Coromandel Peninsula. In all occupation levels the protein component of the diet consisted primarily of shellfish. Very little bird bone, sea

mammal or dog bone was present and fish bone recovered was not extensive although decomposition may partly account for this. Moa was represented in the midden only by industrial fragments and cannot be taken as an indication that moa was on the menu. One large piece of unidentified cetacean vertebrae was found in the pit fill, as was a small cut fragment, but again these do not necessarily imply cetaceans were eaten. Most surprisingly *Cellana denticulata* was very rare in the middens (but more common in some of the samples from Jolly's excavations).

Rowlands (1976) identified *C. denticulata* as a marker species which reacted adversely to human predation and became locally extinct soon after first settlement. He also remarked that a predominantly shell midden without *C. denticulata* and with little marine mammal or bird bone, was probably late Archaic, dating to the 16th or 17th century (Rowlands 1976:8). However, Rowlands also cautioned that absence of *C. denticulata* in itself need not be proof of a site's age but should be considered along with the presence or absence of other limpet species (Rowlands 1976:13). At Whitipirorua, limpet species made a minimal contribution; thus it appears the people practiced selective gathering, especially in Occupation II where mussel is so abundant.

In addition to dietary evidence, the high proportion of local obsidian and small quantity of Mayor Island obsidian is contrary to the situation in all other Coromandel Archaic sites, even when a local obsidian source is present nearby. Obsidian samples recovered by Jolly also indicate a high proportion of local obsidian, estimated to be in excess of 80% (Furey 1990:47). Whitipirorua differs from other sites with nearby stone sources in that it is literally sitting on the obsidian source found in cobble and boulder form in the soil. Presumably the local occurrence of chert on the beach and in stream beds was a bonus which would have made the place attractive even in the earliest period of settlement.

With this combination of evidence it might be reasoned that Whitipirorua represents a late site; radiocarbon dates, however, do not support this. As there is no basis for doubting the radiocarbon dates, explanations must therefore be sought to explain why Whitipirorua goes against the general trend.

One other site, T11/242 at Hahei, presents similar evidence to Whitipirorua. Here the absence of Archaic-type artefacts, together with the absence of extinct birds, seal and Mayor Island obsidian, led Nichol (1986:179), prior to obtaining radiocarbon dates, to reject any interpretation of the site being of an early age. Radiocarbon age estimates however indicate early occupation with dates of 615 $\pm$ 54 BP and 595 $\pm$ 54 BP(Nichol 1986:197). It was apparent from analysis of the midden that *Cellana denticulata* was present but dropped out over time, and although the midden was predominantly composed of shellfish there were also shearwaters and a large number of small fish (labrids). Nichol (1986:180, 194-5), reflecting on the absence of certain body parts of birds and fish and *Turbo smaragdus* shells, suggested an important site function may have been food processing and storage, and that midden was likely to have been deposited in late summer over a period of a few weeks.

Evidence from the Hahei site indicates that there is no such thing as a typical Coromandel Archaic site and adds further data to the picture of a settlement system composed of a number of sites reflecting seasonal and general activities. Therefore the

presence or absence of certain shellfish species, or moa and seal, need not date sites but may simply reflect the activity being carried out at the time.

Coromandel sites do represent a variety of sites within the overall Archaic settlement pattern. At one end of the scale is Sarah's Gully with all the components normally associated with a village. These include house sites, storage pits, cooking and refuse disposal areas, artefact manufacture, evidence of horticulture in the form of slope drains, and human burials. Short term seasonal hunting camps are also present: Tairua, a site of small size with a limited range of activities, is an example (Rowlands 1977:138, 142), possibly occupied briefly in winter. Unfortunately too small an area of many of the other Archaic sites has been investigated to allow any conclusion on duration of occupation or seasonal hunting camps versus permanent settlements. T11/326 at Hahei had a number of the components uncovered at Sarah's Gully. It was a large site with storage pits, artefact manufacture, cooking and food disposal and burials. By inference, houses of some form should also have been present, although these were not found in the area excavated. Regrettably only a small part of Hahei was archaeologically investigated. Interpretation of occupation duration and primary activity in the remaining Archaic sites stems from the small areas investigated and the focus on midden excavation rather than in identifying associated living settlements.

Whitipirorua, because of its large size, the variety and quantity of artefacts present and components such as cooking, storage, and burials (recorded from the eastern end of the site), can probably also be placed at the more permanently occupied end of the settlement range.

Sites of an inferred early age are known from Whangamata where the Wharf Site, T12/2, (Allo 1972), Cabana Lodge, T12/2 (Jolly 1978b) and T12/3 (Shawcross 1964) were investigated with varying degrees of expertise. It is possible that all three sites are part of one large settlement but the relationship has not been established. None of the sites have been dated — the early age being inferred from the presence of moa bone and artefacts such as trolling lures and one-piece fishhooks of Opito Type I (Davidson 1984:251). Whangamata Wharf, however, has the distinction of producing a large number of individual dog remains. Apart from one moa, and a small number of early type artefacts, there was little else to readily identify the site as early.

Another early site, T12/26 (see Fig. 1), south of Whitipirorua, had moa bone, large quantities of obsidian and basalt flakes, a fragment of bone trolling lure, evidence of one-piece bone fishhook manufacturing and fragments of two shell fishhooks (Jolly 1978a).

Artefacts from all these sites bear a close resemblance to the assemblage from Whitipirorua. With the exception of Whangamata Wharf no analysis has been made of material from these sites, so that it is difficult to make other comparisons.

The contemporaneity of the northern part of Whitipirorua, investigated by Jolly, and the southern part, the subject of this paper, cannot be established. Several differences are apparent between the material recovered by Jolly and deposited in the Auckland Museum, and the content of the 1986-88 investigations.

Firstly, Jolly's samples contained large quantities of pumice, which was absent in the recent excavation squares. Secondly, *Cellana denticulata* was present in many of the midden samples, although it is not known if the samples were total samples, grab samples or species selective. By contrast, only one *C. denticulata* was present in the middens excavated. Thirdly, the amount of manufacturing debris — sandstone chips, obsidian and other stone flakes and bone fragments — is very different. Even allowing for Jolly's material to come from a much larger area, comparable samples could not be obtained from the recent excavations. The implication of much of this evidence is that Jolly's Sites '1' and '2' reflect yet another occupation, perhaps earlier in time, or alternatively represent a different type of settlement. Davidson (1979:200) in a brief summary of Coromandel Archaic sites suggested that although the artefacts in the Jolly assemblage fell within the period between mid-thirteenth and sixteenth centuries, some artefacts may have been of an earlier age.

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EXCAVATIONS AT TAYLOR'S HILL, R11/96, AUCKLAND

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Abstract. The Taylor's Hill excavation, on a small Auckland volcanic cone pa, was the first effort in stratigraphic excavation of a North Island archaeological site. It was carried out between 1954 and 1956 while part of the site was being quarried. Two separate areas were opened up, both producing a number of artefacts and some faunal material, especially dog bone. The excavation included part of a platform and some terraces, most of which had pits dug into them. No house sites were found. Radiocarbon dates suggest an occupation period sometime between the 15th and 18th century.

Quarrying of the eastern portion of Taylor's Hill in 1954 uncovered Maori artefacts and human skeletal remains. Jack Golson, then a newly appointed Lecturer in Prehistory in the Anthropology Department, University of Auckland, was consulted about what was to be done with the finds. A series of salvage excavations took place between 1954 and 1956 in an attempt to obtain as much information as possible before quarrying destroyed the eastern ridge of the site. The excavations were carried out under Golson's supervision by anthropology students and volunteers. This was the first excavation undertaken by Golson after his arrival in New Zealand, and the first stratigraphic excavation of a North Island archaeological site.

The first excavation started on 31 July 1954, and continued until 18 September. It involved a series of squares designated E to K on the lower northern slope (Fig. 1, inset). Later work was spasmodic, as time allowed, and continued from July 1955 until June 1956 approximately. A long trench (squares N to W) was set out parallel to the earlier excavation but higher up the slope. It crossed two terraces and scarps and extended up to the flat platform just east of the crater. Quarrying of this area had begun and the excavation was carried on while it was in progress.

This report is based primarily on notes and drawings kindly made available by Professor Golson, and on the assemblage from the excavations now in the Auckland Instsitute and Museum. The skeletal remains were sent by Golson to the Otago Medical School and are not discussed here. Other sources of information include photographs of the excavation in the Anthropology Department, University of Auckland, and later plans of the site by a variety of people.

Throughout the report, artefacts are referred to by their Auckland Museum catalogue numbers. These replace the original numbers in the catalogue of finds from the excavation.

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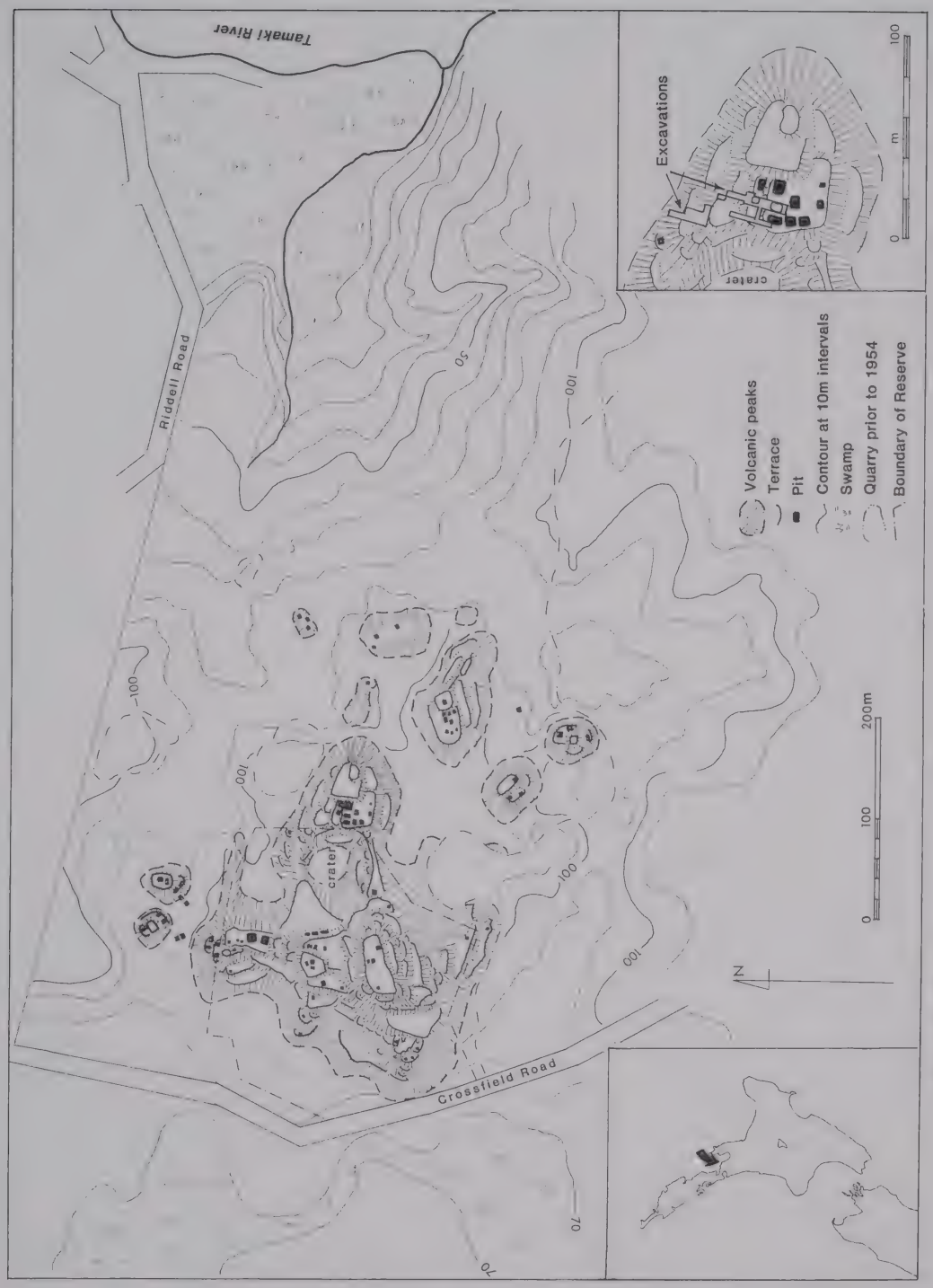


Fig. 1. Reconstructed plan of Taylor's Hill (R11/96) and environs. Inset shows excavated areas.

Site description

Taylor's Hill is a low volcanic cone situated on the western side of the Tamaki River not far south of the West Tamaki Head. It is about one kilometre inland from the present shore line although it was probably closer to the water in prehistoric times.

The hill and its various scoria ridges were modified by the early Maori settlers who constructed level platforms and numerous slope terraces as living and activity areas. The numerous small hillocks (rafted scoria blocks) external to the main hill were also modified in similar ways. The site was once far more extensive than it is now. All that remains is the reserve area as shown in Fig. 1. There are numerous storage pits on the site, suggesting that the surrounding land was once used for gardens, although there is little remaining evidence of them or of the stone boundary rows once so common around many Auckand pa.

There is no surface evidence of ditch and/or bank defences. The site may never have been a defended pa, or it may have been built before the appearance in the Auckland region of ditch and bank features.

The lava flow east of the crater was almost entirely separated from the main part of the site, only being connected to it by a narrow ridge along the south-west side, representing the remnants of the old crater rim. This narrow strip would have been a suitable place for a ditch if one had been required. It was on the northern slopes of the eastern ridge promotory that the excavation was carried out, as the hillock was being quarried away.

The site plan (Fig. 1) is the result of a 'best fit' approach to a number of photographs, drawings and plans (C. Phillips pers. comm.) as follows.

1. Within the reserve: David Bulmer's composite map of the Auckland University Anthropology Department M.A. course field work excercises; subsequently field checked by Bulmer.

2. Outside the reserve: aerial photographs and a 1965 sketch map by Lawrie Birks.

3. A contour map by Kenneth Mills (pre-1954).

4. Elevations of squares from Golson's site plans which were plotted as a contour map and overlaid on the Mills contour map. The best fit approach was again applied.

Traditional history

Tauoma is the name given to the eastern strip of land along the western side of the Tamaki River. Its southern boundary, Whakamahu, extended to but did not include Maungarei (Mt Wellington). Tauoma was given by Ngati Whatua to Ngati Paoa at the end of the 18th century. Prior to that the Tamaki River channel formed the eastern boundary of the Waiohua tribe in the 18th century and later, for a time, the Ngati Whatua.

The name Taurere is attributed to Taylor's Hill, although there is little firm evidence to support this. Taurere is said to be the major pa on Tauoma and was occupied by Ngati Paoa in the early 19th century (Agnes Sullivan pers. comm.).

Traditionally, Titahi, his daughter Parehuia and his grand-daughter Ruahine are said to have lived at one time at Taurere. Titahi is also associated with Maungakiekie (One Tree Hill) and Owairaka (Mt Albert) so that the site of Taurere could have had a history of long, though probably intermittent, occupation through the prehistoric sequence.

Simmons (Simmons n.d.) discusses some of the traditions of the Auckland Isthmus and mentions that Titahi is traditionally associated with having introduced the idea of terracing the volcanic cones. His daughter Parehuia married Tauranga, went to live in Taranaki and gave birth to a daughter Ruahine. Parehuia eventually returned to her old home, Taurere, and before she died asked that her body be suspended in a carved coffin in the branches of her beloved karaka trees. Her dying instruction was that her daughter would return and the sign of her coming would be a white heron at Waipuna. This is a famous stream of fresh water which was the supply for Taurere pa. The prediction was fulfilled and Ruahine returned and married. From that marriage are descended many of the leading chiefs of Tamaki-makau-rau.

The name Taylor's Hill came from the Taylor family who owned the land for many years. William Taylor, the eldest son of General Taylor, bought the land which included the terraced volcanic cone for 400 pounds in 1845. Later, in the 1920s, the Taylor's Hill area was offered as a public reserve.

Geology

The volcanic cone now known as Taylor's Hill erupted some time between 20,000 and 50,000 years ago. The initial activity was mainly effusive and formed a large tuff ring and a cluster of tiny scoria cones within the ring. Later, a complex scoria cone was built up and the tuff ring was partly destroyed by the accompanying explosion. One small lava flow moved east towards the Tamaki River and rafted away part of the scoria cone. The rafted blocks formed small isolated mounds of scoria on the surface of the flow.

The main flow to the north escaped through a breach in the crater and turned east towards the Tamaki River (Searle 1981). The eruption blocked the valley stream and a swamp formed inland to the west. The old stream found a new course. Only the north-west section of the volcanic area is preserved as a reserve, the rest having been extensively quarried.

THE LOWER EXCAVATIONS: SQUARES E-K

No plans or section drawings are available for this area. The excavation was gridded into 10 foot squares (3.048 m) and labelled east to west by numbers and north to south by letters (E-K). This same grid was used for the subsequent N-W excavation. Fig. 2 shows the northern slopes and the position of the two excavations.

Fig. 2. Areas excavated, looking south.

Within the grid, six foot (1.82 m) squares were opened up and later some baulks were removed. The E-K excavation area ran upwards and southwards in a series of squares designated E-K 100 and extended to 101 in H-J rows of squares and to Squares 103 in the K row. Field notes mention some work in Square K 104 but there is little information on this. Some areas in the excavation were not recorded in detail and are therefore not discussed or only briefly mentioned in this report.

In this area of the excavation, the layers described were as follows:

1. top soil;
1a. thin layer of shell under top soil;
2. scoria with a few artefacts;
2a. intermediate yellowish-brown clayey earth with scoria;
2b. shell rubbish containing cultural material;
3. weathered top of clay subsoil;
4. volcanic clay subsoil.

Layers 2, 2a and 2b were the main cultural layers defined, although some material came from other lenses or layers. The deeper Layers 3 and 4 are mentioned but not discussed.

The excavation diary notes that the terrace showing in Square K 100 was dug into a former shell occupation layer indicating at least two phases of occupation, but the exact relationship was not resolved and it is mentioned that the terrace appeared to have been extended and artificially built up.

The lower squares produced little artefactual material and exposed mainly slopes and scarps and the talus that had acculumated down the slope, both from natural erosion and from activities further up. Higher up again, towards the edge of a small terrace, the occupational debris increased and layering became more evident. This led to the upper squares being extended.

Adzes

The butt portion of a broken stone implement, AR7598 (Fig. 20), was found in the baulk between Squares I and J 100. It is made from Tahanga basalt and has a rather narrow-waisted hammer-dressed 'handle'. It could be the remains of a small patu or pounder, but more probably was an adze. The under part of the butt is polished over hammer-dressing and there is polishing on the upper side near the break. The broken end is damaged and crushed by pounding, as is the butt top, suggesting re-use after breakage.

Two broken adzes came from Square J 101. AR7602 (Fig. 24) is the polished bevel end of a coarse-grained greywacke adze. The bevel shoulder is somewhat rounded and the bevel edge slightly angled. There are use marks along the blade. AR7613 (Fig. 35) is the end portion of the bevel of what was possibly a hogback, Type 4a, adze (Duff 1956:Fig. 43). It is made from fine-grained greywacke and the piece has been struck from the bevel, possibly after the main body of the adze had been broken. One of the broken edges has been used to cut or saw.

AR7650c is the butt end of a sub-triangular cross-sectioned fine-grained greywacke preform. It has been formed by flaking and is partly hammer-dressed. AR7650e is the butt of an oval cross-sectioned fine-grained greywacke preform which has been heavily hammer-dressed over most of its flaked surface. The edges of the broken section show numerous small chips and bruising suggesting use as a pounder or hammerstone subsequent to breaking. Both came from Square K 100.

The greywacke material is almost entirely from the Waipapa metagreywacke group and is of local origin (Motutapu and Waiheke areas).

Flakes

Two used flakes came from Square I 100. AR7651e (broken in two pieces), is of dark grey metasomatised Nelson argillite. It is from the polished blade of an adze and shows use striations. The back and edges of the flake have been polished after detachment from the adze, suggesting the maximum use of this argillite material. The second is a flake of medium-grained greywacke, AR8164, hammer-dressed on one side with edge damage and reduction along the curve.

Amongst the flakes and stone from Square J 100 is an elongated water-worn pebble of coarse-grained greywacke, AR7651b, with flaked and chipped ends, probably used as a pecking or hammer-dressing tool. There is also a small flake from a polished adze, AR8169 and a large flake of Tahanga or Mangatawhiri basalt (AR8167a).

A hand drill, AR7610 (Fig. 32), was found in Square K 102. It is pointed and triangular in cross section with a flat back and two irregularly flaked sides. One side angle shows pressure flaking along the edge. It may be slightly sand-blasted.

AR8167b from Square K 101 is a large core of greywacke with some flakes struck from it. One corner shows a rough colluvial cortex.

A small greenish chert flake (AR8169o), with a water worn surface and possible pressure wear along one edge, came from Square K 103. This chert occurs in association with the Waipapa group of metagreywackes.

A number of greywacke flakes, including a few showing some hammer-dressing, came from the E-K area. These are presumed to be debris from adze making or repair.

Hammerstones

AR7622 (Fig. 44) from Square I 101, is a reddish jasper and quartz hammerstone, from the Waipapa group of rocks, possibly from Waiheke Island or the Firth of Thames coast. It is heavily crushed on one side and bruised around one edge. One side has been broken away, probably before use.

AR8166 is a small oval stone of scoria-like material, possibly water-rolled, which may have been used as a hammerstone. Two surfaces are very rough, possibly as a result of bruising. It came from Square K 103.

Sandstone and hoanga

A sandstone hoanga, AR7626 (Fig. 48), came from Square I 101. This is a flat oval piece of fine-grained sandstone, probably from the Waitemata group, broken in half. One side has been used to form a smoothly concave grinding surface with numerous narrow shallow grooves in one area.

A piece of artificially shaped sandstone AR8165, came from Square J 101. The interior has been hallowed out and it appears to be a segment of a shallow broken bowl-shaped item.

One object, AR7617 (Fig. 39), described as a "fishing sinker" in the original artefact list, is a quadrangular lump of reddish iron aggregate which, when rubbed, released a fine red powder. It is about 20 mm thick and has a V-shaped groove cut centrally around it. These aggregates occur in joints of Waitemata sandstone. Kathy Prickett (pers. comm.) suggests that the groove could be preliminary to breaking it in half to form kokowai sticks.

The other item, AR7616 (Fig. 38), is a broken perforated disc. It is browny-red in colour and probably carved from very hard clay rather than hand moulded and baked. The perforation has parallel sides rather than the V-shaped ones associated with a bored hole. Rather similar objects have been found in several other sites in the Auckland area (Louise Furey pers. comm.). Its use is unknown but it could be the remains of an ornamental bead or perhaps a spindle weight (Dante Bonica pers. comm.). This last suggestion would place the piece in the post-European period. It came from Layer 2a in Square K 100.

Bone

A bone tattooing chisel, AR7628 (Fig. 49), from Square H 101 is a poorly finished bone sliver tapered at the operative end, into which four very sharp teeth have been cut. There is a blue/black pigment residue and stain between the teeth. The hole in the upper part has been bored slightly to one side of the centre and a piece of bone has subsequently broken away at the upper edge.

AR7639, from baulk J/K 100, Layer 3, consisted of a small length of bone possibly smashed from a dog mandible. There is use polishing at the pointed end.

The bone point AR7637 (Fig. 53) from baulk J/K 101, consisted of a slightly curved piece of bone, possibly the remains of a needle. The point has been cut at an angle across the bone shaft and exposed the interior lamella. The other end has been cut across and then broken. At the break a V-shaped incision has been made and two grooves cut across the incision edges on one side.

A dog jaw, AR7653, with a broken ramus has had the base of the jaw cut away, probably to produce a strip of bone for use as part of a two-piece fishhook, leaving the alveolar process as waste material. It came from Square K 102.

Discussion

The E-K area, although well down the northern slopes of the eastern ridge, could have been used intermittently. The artefacts, except for the tattooing chisel, were all broken or suggested casual use. Most of the cultural material, including a considerable amount of broken and exploded stone, a little obsidian, shell and assorted bone, came from the Squares H-K, but much of it could have collected there by rolling down the slope.

The Layer 2 complex described in this area is not necessarily the same as the Layer 2 complex in the excavation higher up the slope, but they seem fairly similar and could represent the final occupation of the site. Indications of layers below Layer 2 in the E-K excavation were minimal. No pits were found.

THE UPPER EXCAVATION : SQUARES N-W

This excavation commenced a few metres east of and higher up than the earlier one (Fig. 1), but was within the same grid system. Squares excavated were along the N to W lines north and south and lines 104 to 106 east to west. There was also a narrow trench extension west from Square S which turned at right angles to extend north and south, parallel to the main excavation. Other investigations were made at bulldozer cuts and where burials were exposed but there is little documentation for these.

Part of Terrace A (Figs. 3, 4) was excavated (Squares N and O) and then work continued southwards up to Terrace B (Squares P,Q, R and part of S), finally ending on the platform above the eastern crater edge (Squares T, U,V and W). The long section drawings ended at the U/V boundary, but there was probably thin stratigraphy on the platform around the pits. A number of squares and baulks not shown on the floor plan were also excavated. The main layers noted were:

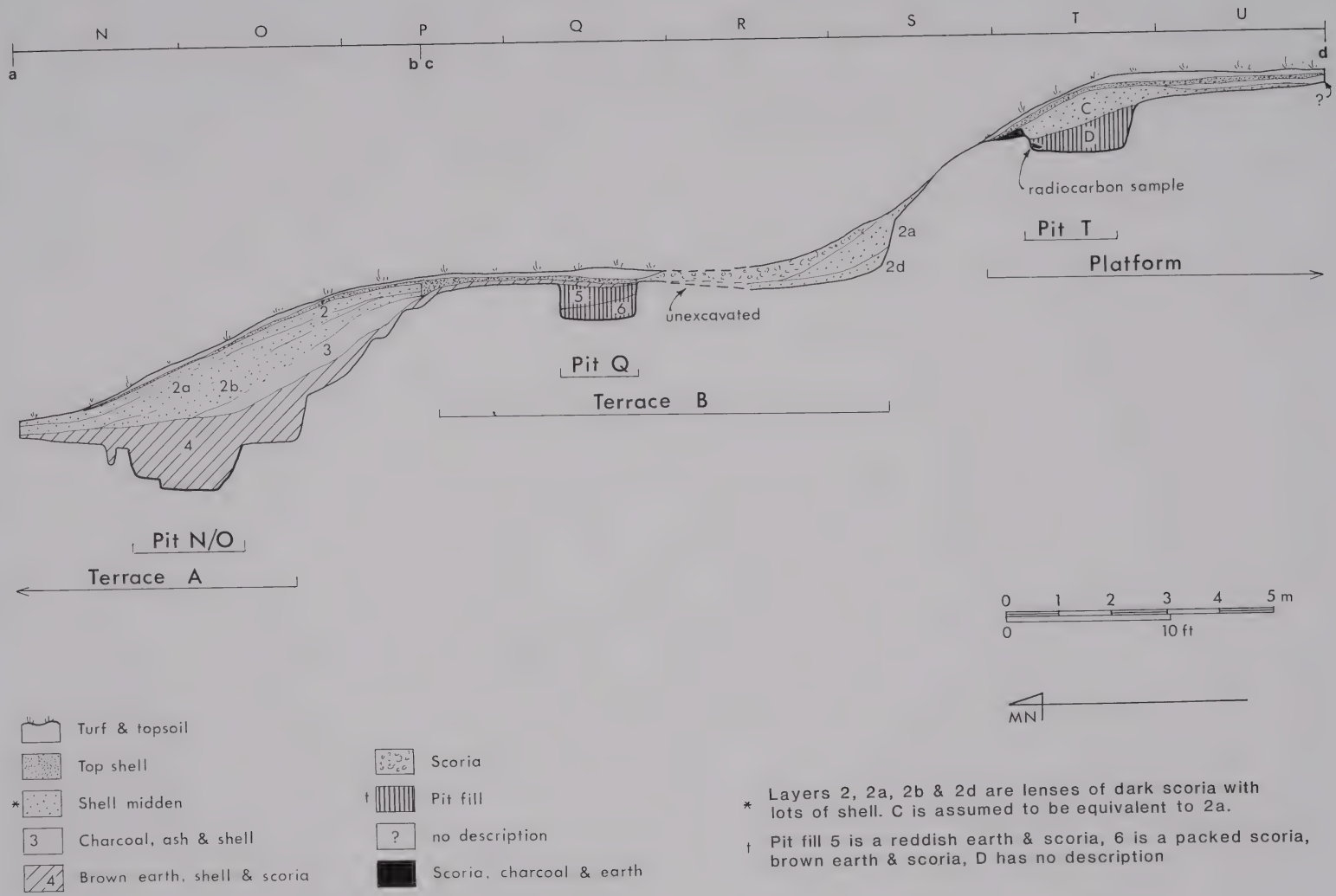


Fig. 3. Long section, Squares N-U.

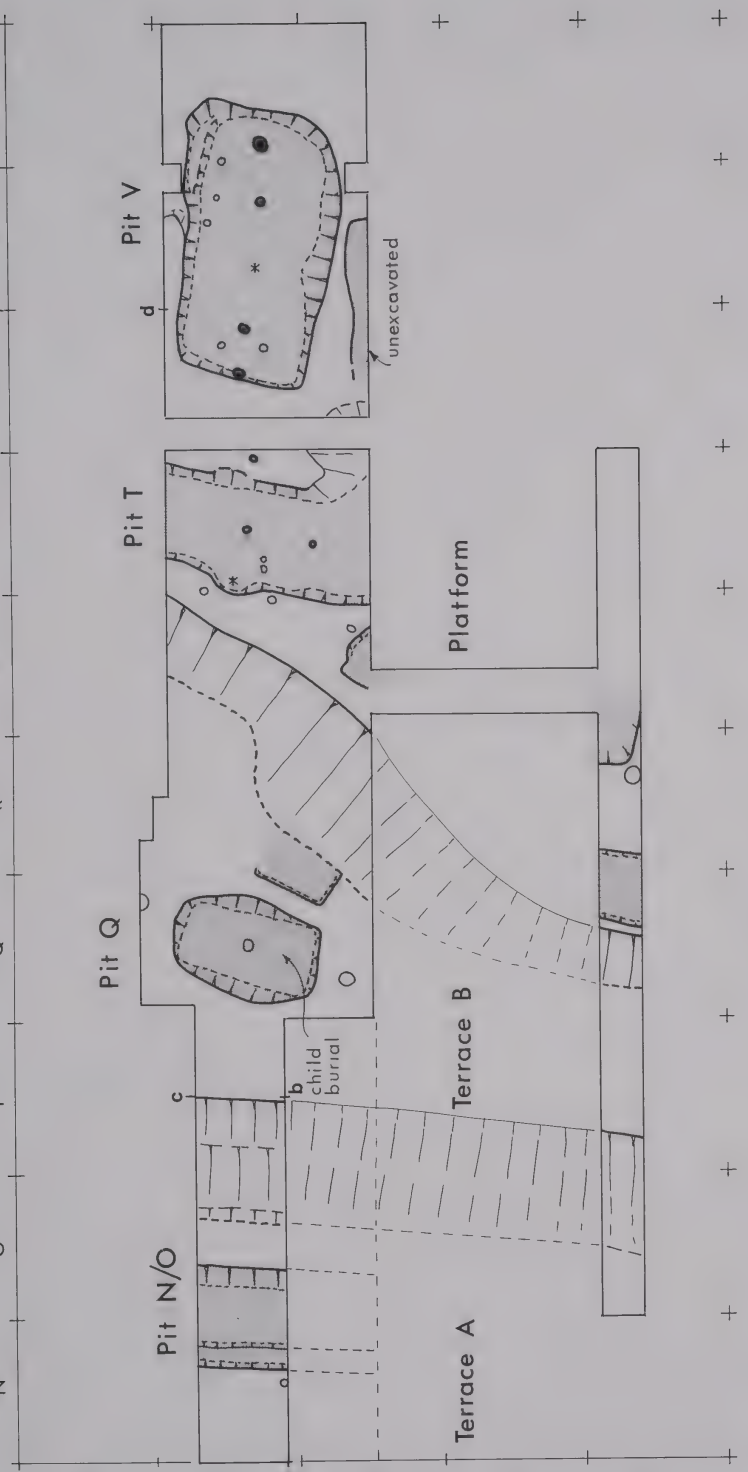


Fig. 4. Floor plan, Squares N-W.

Layer 1.	top soil;
Layers 2, 2a and 2b.	black scoria with some earth and lots of shell, in lenses;
Layer 3.	charcoal, ash and shell;
Layer 4.	brown earth, shell and scoria (pit fills);
Layers 5 and 6.	pit fills (Pit T fill noted as C and D).

The long section

The long section through Squares N to U (Fig. 3) gives a general idea of the stratigraphy of this part of the excavation and is probably fairly representative of the occupation of this portion of the site. It was drawn along the eastern baulk line and reconstructed from a number of rough field drawings, some sections of which do not connect directly, for example in Square P, b - c, where there is a *ca.* 1 m shift eastwards (see Figs. 3, 4). The layer numbers and their connections were not clarified when the excavation closed so that interpretation of the long section is only tentative.

In Squares N, O and P the stratigraphy in the Fig. 3 section is fairly clear, but higher up, over Terrace B and the platform, the layering becomes confused. The fill of Pit N/O consists of the same material as that which covers the fill of Pit Q above, on Terrace B. This fill also overflows Pit N/O and covers Terrace A.

Terrace A appears to have been built with a very steep scarp and Pit N/O was dug into it soon afterwards. The pit had a ledge along its north side wall and an external posthole shows in the baulk although this is not recorded on the floor plan (see below). Later this pit was filled in, probably from a source higher up the slope as the Layer 4 material forms a thin layer over the northern edge of Terrace B, sealing over the Pit Q fill and flowing down the scarp into Pit N/O. The disappearance of Layer 4 further back on Terrace B could be accounted for by an unexcavated portion or alteration of the back scarp after the Layer 4 material has been deposited.

From the back of Terrace B the stratigraphy becomes confused and it is not clear whether Pit Q was filled in before Layer 4 was deposited over it or whether the two pits were filled in about the same time. Closer to the Terrace B scarp the Layer 2 lenses (2a and 2d) rest directly on the natural with Layer 2d the lowest. No evidence for earlier layers was present.

Above the Terrace B scarp the position of Pit T at the edge of the platform could suggest that the scarp was cut back at some time after the pit had been built. It was originally suggested in the field notes that the Pit T feature across the north end of the platform was some sort of ditch, as the ends of the pit were not established. There were some indistinct stake holes along the pit's outer edge and a charcoal and ash layer that could have been the result of the burning of a palisade but this theory was later discounted and some doubt was cast on the stake holes.

Further excavation showed that the north edge of Pit T had been cut through a thin layer of scoria, ash and charcoal, and an embrasure in the north wall of the pit also contained this material. It was from the base of this that a carbon sample was collected (NZ 7770). This ash layer is not noted in any other part of the excavation. The south side of the pit was described as a wall of natural scoria falling to a flat bottom.

The fill of Pit T consisted of two parts. The upper, fill C (described in the field notes as very similar to Layer 2a), seems to have been placed over the lower fill to cap and over-fill the depression and possibly to extend and compact the edge of the platform. These activities indicate three separate events, the depositing of the ash layer, the digging of a pit through it, and the subsequent filling in of the pit. Pit T does not show as a surface feature or depression on the aerial photograph because of the deliberate over-filling of the pit surface.

Interpretation of the cross-section is tenuous but it could be postulated that the excavated Terraces A and B and their pits were the result of early activities, but not the earliest as the top of the scarp of Terrace B cuts through the scoria, charcoal and earth layer at the edge of the platform above. Later the pits were filled in and the terraces took on a different use and a more modified outline. The scarp angles became less acute and the edges of the terraces, although keeping the same flat area, moved forward. Terrace B may have become an area set aside for obsidian flaking at a later period.

Floor plans

Fig. 4 shows the Squares N-W plans. The interpretation of these is easier than that of the long stratigraphic section. Because of the drawn out and spasmodic nature of the excavation in this area, not all excavated squares are included in the floor plan, nonetheless all the principal structures are shown.

The excavation eventually opened up an approximately 4 m trench up through Squares N-P. On reaching Terrace B the trench was widened out to explore the various features as they were found.

The trench in the N-P area uncovered the central part of what was presumed to be a pit but the ends were not found. This pit (N/O) was orientated in an east-west direction and was built into Terrace A, close and parallel to the terrace scarp.

Pit N/O was about 1.2 m wide and had a ledge along its north side. Just north of and outside the pit was a posthole about 150 mm across and 220 mm in depth. A similar posthole occurred about 1.9 m to the east but is only shown on the long section.

Terrace B was exposed in Squares P, Q, R and part of S. In Square Q was a pit (Pit Q) that was fully excavated (Fig. 5). It was orientated approximately east-west along the terrace and measured 2.7 x 1.5 x 0.67 m. It had one central posthole and there were two external ones approximately 500 mm from the east and west ends respectively. The two external postholes were about 170 mm deep. The pit was filled with a reddish earth and scoria on top of an underlying brownish material. In the west part of the pit fill a baby's skeleton in a crouched position was found. The grave had been cut through a scoria layer and then into a pumice and sandy layer. This material may have been an intrusion added at the time of burial.

Evidence for another pit running parallel to but south of Pit Q is shown on the plan but little mention is made of it in the field notes. Its southern edge appears to go under the scarp and may have been covered by talus spilling down the slope.

Fig. 5. Photograph of Pit Q.

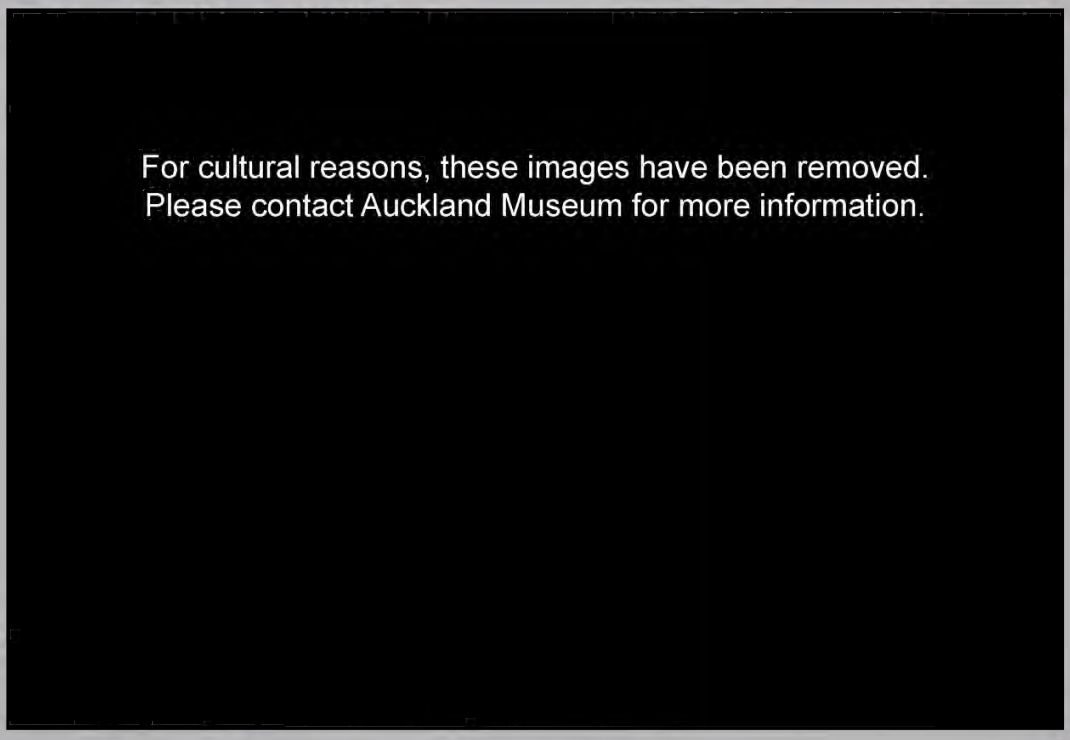


Fig. 6. Photograph of Pit V.

Square S was situated on the scarp rising up to the main platform. Almost at the outer edge of the top of the scarp was a pit or trench (Pit T). This also was oriented east-west. It was exposed to the full width of the excavation but no ends were uncovered. At the western end of the southern edge of the pit the wall appeared to curve round. Field notes suggest that the scoria was cut away by some sort of pit which was filled, at least partly, by shell — virtually all cockle with a few pipi and scallop together with fish bone. The northern wall of Pit T was cut into the remains of an earlier layer. A number of postholes in and around Pit T are shown on the plans but there is little information recorded about them. The two postholes in the centre of Pit T were both over 300 mm deep. The stake holes outside and to the north of Pit T were considered to be tenuous and indistinct.

Pit V which was excavated in Squares U, V and W (Fig. 6), was visible on the surface — one of a number of large pits on the platform. It measured 1.82 x 5.84 x 1.21 m approximately. There were four postholes along the long axis of the pit. There were several other holes in the floor suggesting re-use of the pit by shoring up of decaying or weakened roof supports over time. A shell sample NZ 7753 (see below) was taken from the base of the pit fill in Square V 105.

Several other features such as pits and postholes were uncovered but not fully investigated. The floor plan also includes a narrow trench extension with evidence for more pits and post-holes in the north-western side of the platform but little further information about them has survived.

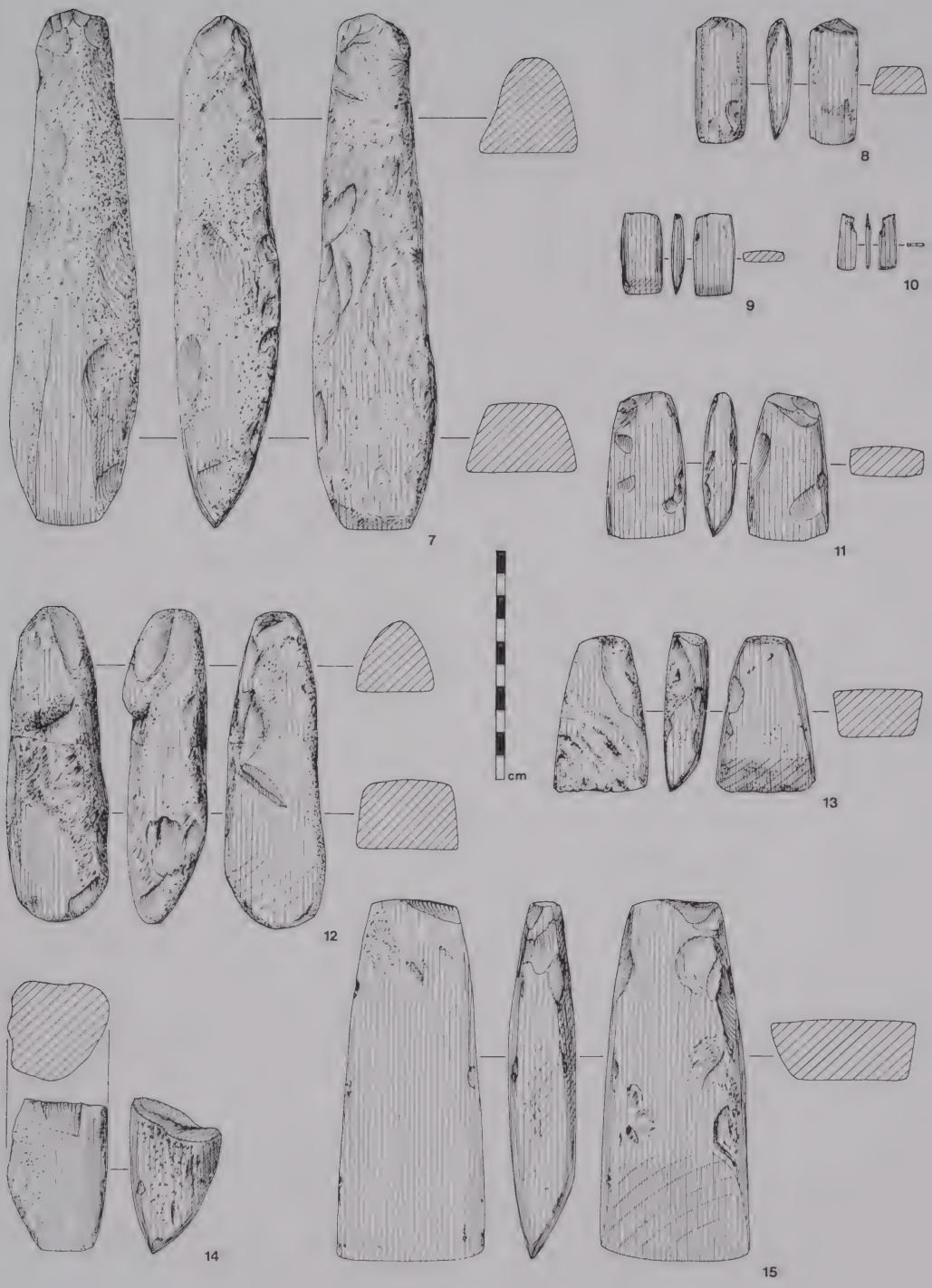
Trenches A and C

These two trenches are represented by the western extension to Square S and the narrow trench in S102 shown in Fig. 4 (J. Golson pers. comm.). A few artefacts and some bone material came from them.

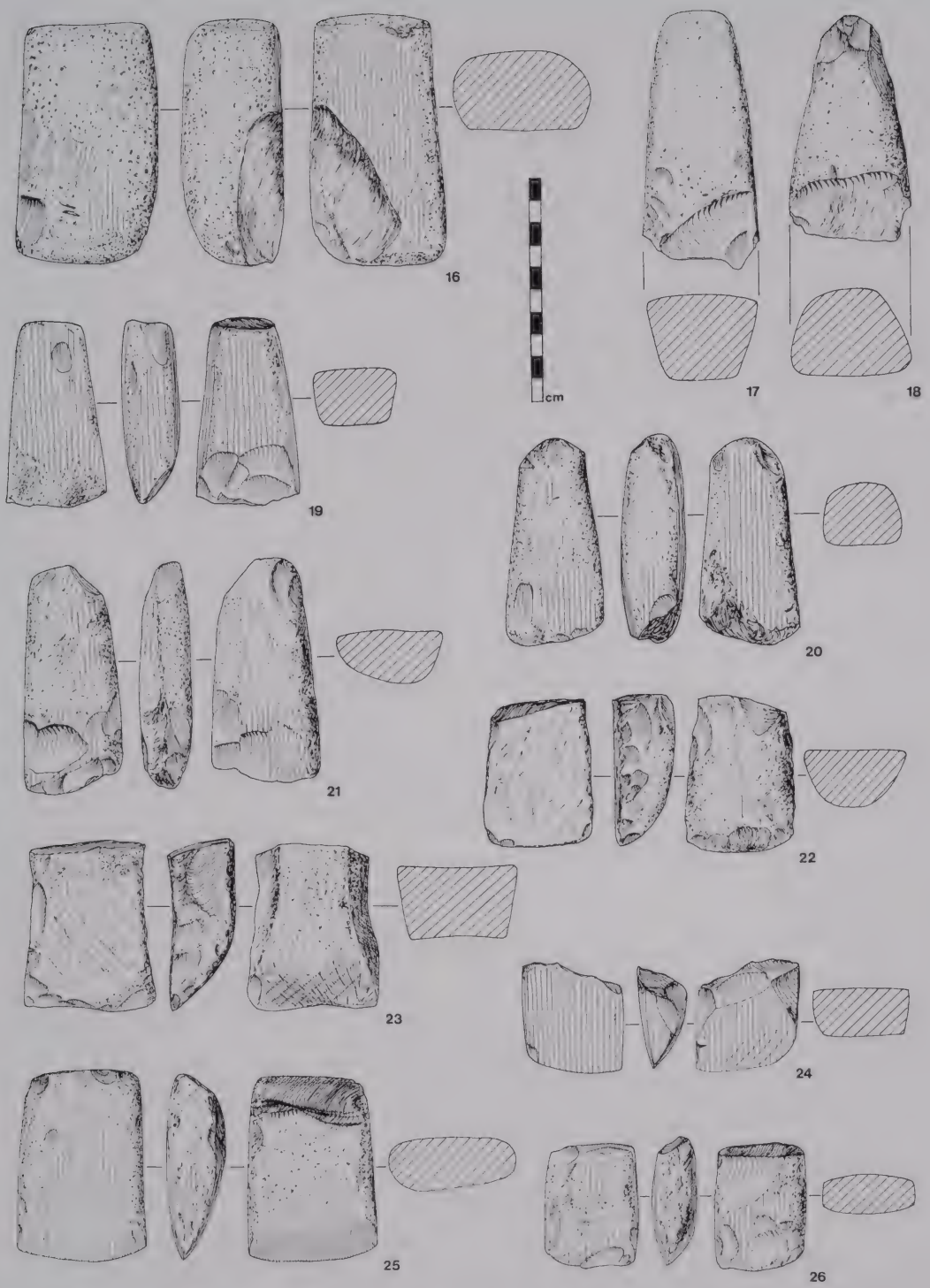
Adzes

Adze AR7605 (Fig. 27) is a stubby, heavy adze with a quadrangular cross-section, polished front and back in the bevel half and hammer-dressed with over-polishing along the butt and sides. The bevel shoulder is rounded and the bevel edge straight and in good condition except where an edge has been ground back to a slight angle. It is made from fine-grained greywacke and has use striations on the blade. It came from Square N 104, Layer 4 pit fill.

The small Type 2B (Duff 1956:166) adze AR7606 (Fig. 28), also reputed to come from the pit edge in Square N 104, is almost entirely polished, with small patches of hammer-dressing. The bevel shoulder is rounded and the bevel edge straight and in good condition. It has been made from fine-grained greywacke and has use striations on the blade. There is an oblong stain and raised deposit along the back of the adze suggesting that it may have been glued to something, possibly for demonstration purposes, suggesting that its original catalogue provenance is more suspect than that of AR7605. It is also the last entry in the list, so it could have been added later. Thus AR7606 may not have come from Square N 104 despite present available information.



Figs. 7-15. Taylor's Hill adzes. 7. AR7586. 8. AR7587. 9. AR7588. 10. AR7589. 11. AR7590. 12. AR7592. 13. AR7591. 14. AR7593. 15. AR7594.



Figs. 16-26. Adzes and roughouts. 16. AR7595. 17. AR7596. 18. AR7649a. 19. AR 7597. 20. AR7598. 21. AR7599. 22. AR7600. 23. AR7601. 24. AR7602. 25. AR7603. 26. AR7604.

AR7607 (Fig. 30) is a thick stubby adze with a quandrangular cross-section, made from fine-grained greywacke. It is polished at the blade end and hammer-dressed over the butt and sides. The bevel shoulder is rounded, the edge straight with a small chip off one corner. The edge has tiny use flakes along it. It came from Square P 105.

A small greenstone chisel, AR7589 (Fig. 10), from Square O 105 has been made from a greenstone flake polished all over with the upper end and side chipped. There is a shallow scarf cut across the uneven top. The bevel edge is straight and bifacially sharpened.

A broken adze AR7591 (Fig. 13) from Square P 105 is a clumsy looking artefact but well used. It is made from a lump of coarse-grained basalt, possibly Tahanga, and has been broken in two parts. It is from a rough, probably naturally shaped piece, slightly flaked, hammer-dressed and irregularly polished on the front. The back has been almost entirely polished. It is close to square in cross-section, and has a natural bump in the front of the butt left to form a hafting device. There is hafting wear polish on the butt. The bevel shoulder is rounded and the blade end has been crushed down to form a curved flat (over 5 mm) blade edge. It suggests re-use of an earlier adze for pounding or hammer-dressing. It was probably abandoned after breaking.

AR7604 (Fig. 26) from Square P 105 is the damaged blade end of a smallish Type 2b adze. It has been flaked, hammer-dressed and the blade is almost bifacially polished. Several flakes have been removed from the blade, possibly as the result of explosion flakes from being in a fire. There is a patch of orange-brown cortex on one surface. AR7649e, also from P 105, is a flaked blade end of a preform with some hammer-dressing. It is subtriangular in cross-section with the front wider than the back. The bevel edge is only roughly flaked. The back shows a natural cortex that has been hammer-dressed and there is slight polishing over the front.

Chisel/adze AR7587 (Fig. 8) from Square Q 104, is partly hammer-dressed and partly polished. The bevel is curved and the slightly angled bevel edge has a number of small nicks along the front suggesting heavy use. AR7649a (Fig. 18) is the butt end of a preform. It has been formed by flaking and hammer-dressing. On one side near the break is a concave hammer-dressed saddle which could suggest modification of the butt for lashing or it might be the result of a natural depression in the stone. Other parts of the preform have been heavily hammer-dressed. AR7650d, also from Square Q 104, appears to have been an adze blank in preparation but broken in half during preliminary flaking. It has one water-rolled surface and may have been in a fire.

The second of the two small greenstone chisels, AR7588 (Fig. 9), came from Square Q 105. It is polished all over with an angled back shoulder and a curved and ground front bevel.

AR7603 (Fig. 25) is the short blade end of an adze which appears to have been re-used after breaking. The front has been hammer-dressed again to include the broken edge and then polished, especially at the bevel end. The back has been polished over the hammer-dressing and the bevel re-ground. The bevel edge is slightly curved and in good condition. It came from Square R 104.

AR7608 (Fig. 29) is a small adze made almost entirely by flaking, with the front and back polished. Numerous deep flake scars remain unpolished and the sides are only lightly polished. The bevel edge is straight and appears unused. The back bevel is curved. The adze looks new. It came from Square T 104.

The small adze AR7590 (Fig. 11) from baulk T/U 104 has been formed by flaking and then polished all over. The bevel shoulder is angled and the bevel edge is slightly curved and shows slight use chipping. It appears to have been burnt as there are a number of explosion flakes over its surface.

Broken adze AR7596 (Fig. 17), from baulk U/V 105 has had two large flakes bifacially struck from the broken end. One flake is larger and deeper than the other, suggesting that the butt was being reworked to form a blade for a smaller adze.

Flakes

A used flake, AR7612 (Fig. 34), from Square N 104, is of fine-grained greywacke with heavy bifacial edge damage and a small area of hammer-dressing. One surface shows a natural water-worn edge and a bulb of percussion slightly polished, suggesting either use wear or possibly exposure to weathering or sand blasting.

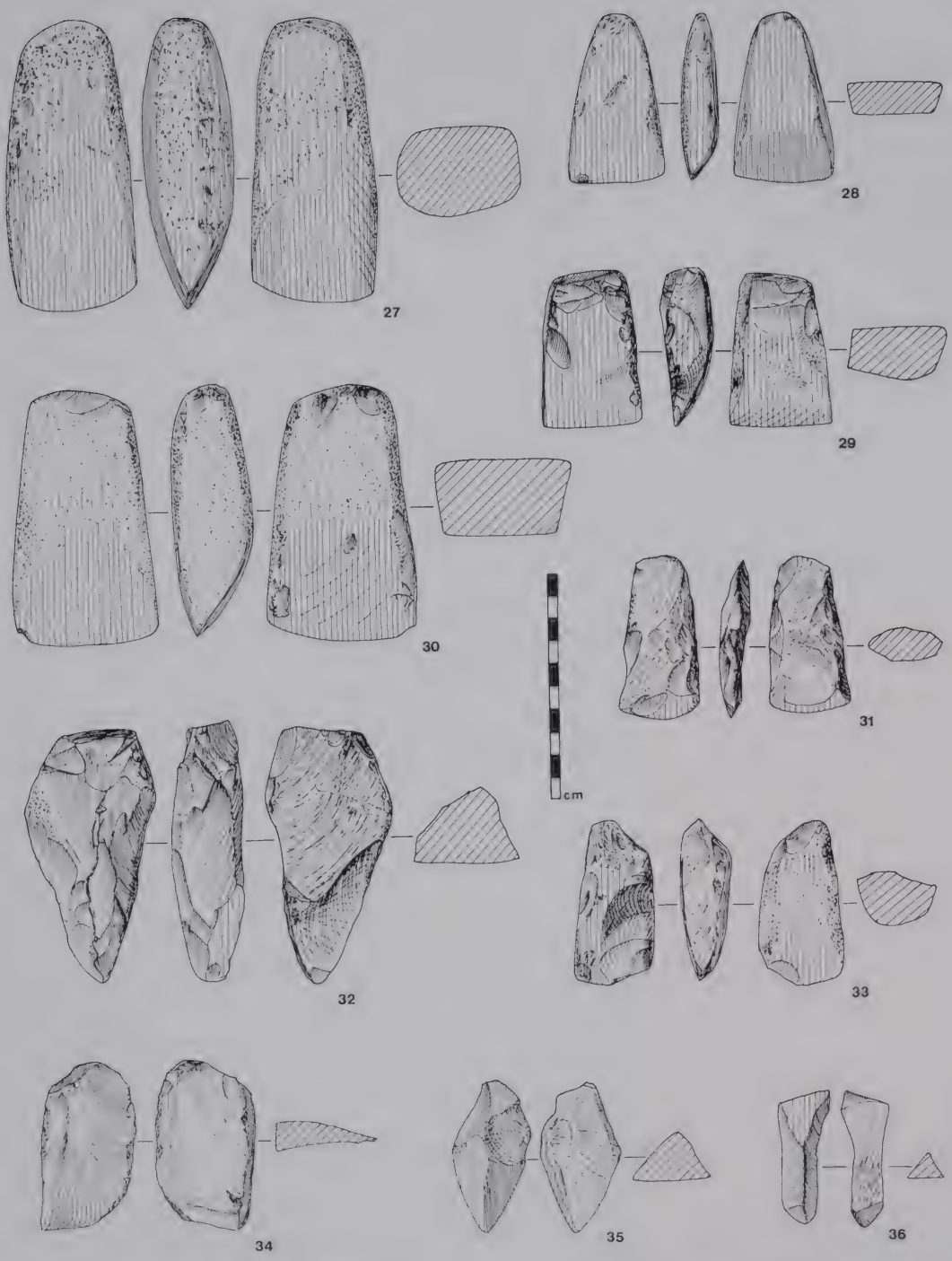
An unusually shaped flake of a piece of exploded fine-grained greywacke came from baulk N 104/105. It is a piece from a large curved water-worn pebble surface. This surface has slight use wear polish on it. The long sharp edge has been used to cut or saw and has use polish along it. The inside irregular ridge is also slightly polished. This may have been deliberately done to smooth a sharp edge that projected against the hand while the flake was being used.

Flake AR8178 is made from medium-grained greywacke with two water-worn surfaces. The sharp edge of the flake has been used as a grooving tool. AR8176 is a triangular fine-grained greywacke flake with one double concave edge modified by flaking or edge damage and the other used as a saw. AR8174 is a flake struck from the corner of a water worn medium-grained greywacke pebble. Two edges have been used for sawing. All were from Square N 105.

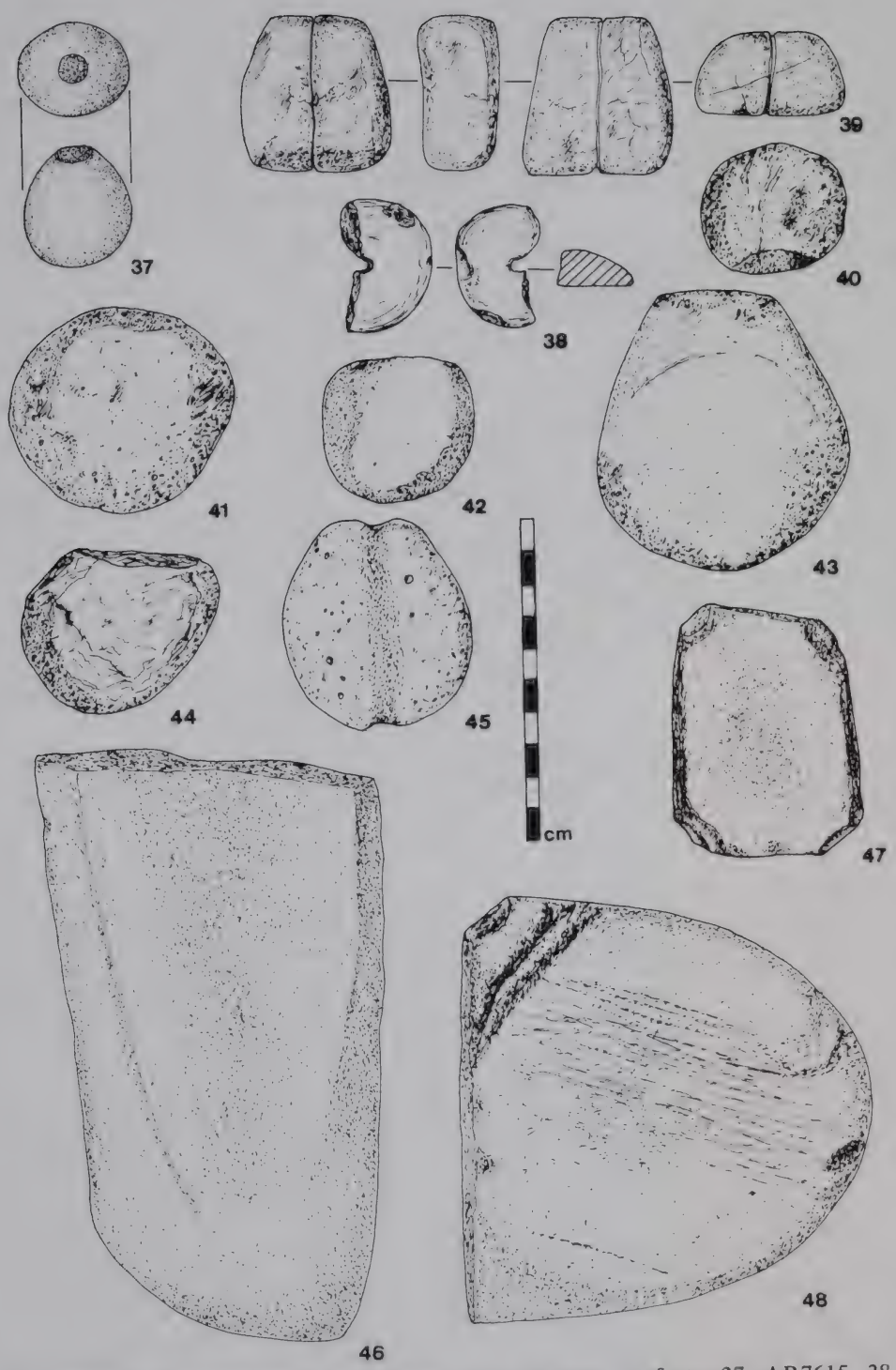
AR8186 from Square O 104 is a used flake made from metasomatised argillite from the Nelson ultramafic zone (probably the Ohana source, D'Urville Island). The flake has a battered edge and also possible unifacial edge damage from use.

AR7614 (Fig. 36) is a triangular piece of fine-grained greywacke. It has one bifacially chipped edge and one slightly polished end surface probably caused by use friction during a sawing process. AR8182 is a greywacke flake with one water worn surface, two ground edges and slight grinding on the inner flake surface. It has been used for grooving. Both came from Square O 105.

From Square P 105 came several flakes. The piece of chert AR7651c has been flaked across the base and further small flakes have been knocked off all four sides to form sharp irregular edges. It is not clear whether most of the edges have been slightly



Figs. 27-36. Adzes and miscellaneous stone artefacts. 27. AR7605. 28. AR7606. 29. AR7608. 30. AR7607. 31. AR7609. 32. AR7610. 33. AR7611. 34. AR7612. 35. AR7613. 36. AR7614.



Figs. 37-48. Hammerstones, hoanga and miscellaneous artefacts. 37. AR7615. 38. AR7616. 39. AR7617. 40. AR7619. 41. AR7618. 42. AR7620. 43. AR7621. 44. AR7622. 45. AR7623. 46. AR7624. 47. AR7625. 48. AR7626.

crushed during flaking or subsequently during use. One end, where a bifacially flaked edge has been formed, has been more heavily crushed by use than the others.

AR8193 is a flake from an adze of Tahanga basalt. It has one polished side and one side hammer-dressed. There is also a piece of obsidian. Part of a polished adze blade, also possibly of Tahanga basalt, AR8196 from Square S 104, has been broken from the bevel edge of an adze. It shows small use chips along the working edge.

A greywacke adze flake, AR8197a, has one polished and one hammer-dressed side. Another, AR8197b, is a small flake showing one polished face. It is possible that they came from the fill of Pit T in the T 104-105 baulk.

AR8200 is a lump of igneous material, possibly from Coromandel. It has been chipped along one side and an attempt made to flake one edge leaving it concave and irregular. It came from baulk U/V 105. Another thin flake of this material was found in Square O 105. Of the obsidian flakes found in this square one piece AR8221b showed secondary flaking along one edge.

Hammerstones

The small hammerstone from Square O 104, AR7620 (Fig. 42) is made from a water-rolled Coromandel chert pebble. It has a natural surface top and bottom and one side where there is an indentation. The other three sides are heavily crushed.

A large pear-shaped hammerstone, AR7621 (Fig. 43), came from Square O 105. It is from a water-worn pebble of coarse-grained greywacke. It is flaked and heavily bruised at the narrow end and crushed around the base. It has an off-white patina over one surface, as do several other stone items, which may be a marine encrustation (Bruce Hayward pers. comm.) although a similar patina was observed by the author on stone material from Whakamoenga Cave, Taupo (Leahy 1976) to which this would not apply.

The other hammerstone from Square O 105, AR7619 (Fig. 40) is small and of pale grey chert with green bands and a little quartz. It is bruised all over except for one slightly concave surface. It probably originated from the Waipapa group of rocks but could be from Coromandel.

A broken green chert hammerstone from Square P 105, AR7651a, has been heavily bruised around the sides and the broken ends also show bruising, probably to prevent the sharp edges from cutting the hand. It comes from a source within the Waipapa group of greywackes.

Sandstone

A small rectangular piece of fine-grained Waitemata sandstone AR7625, (Fig. 47) came from Square N 104. It fits neatly into the palm of the hand and it is well used on one surface. Two pieces of used sandstone came from Square N 105. One, AR8174, is an oblong piece of local origin with the end of one surface slightly concave from use.

AR8175 is a small reddish piece of local sandstone with one narrow edge grooved as if used to smooth a shaft or thin object.

AR8221a from Square P 105 is a short broken, triangular cross-sectioned piece of sandstone, once part of a longer file. There is an oval but broken piece of sandstone, AR8194 from baulk P/Q 105 which has been artificially flattened around the edges, but with the upper and lower surfaces still in their natural state. There is no obvious signs of use wear.

Pumice

A small piece of pumice, AR8199, with signs of abrasion use came from Square T 105.

Bone and shell

AR7640 (Fig. 62) from Square N 104 is a dog mandible, the front part of which has been broken off after the lateral (lower) border has been cut away. The broken edge of the ramus has been notched to a cockscomb form and below this two stepped notches were cut in the bone behind the back teeth. The other mandible from this square, AR7654a, is a broken posterior end with the lateral border smashed off.

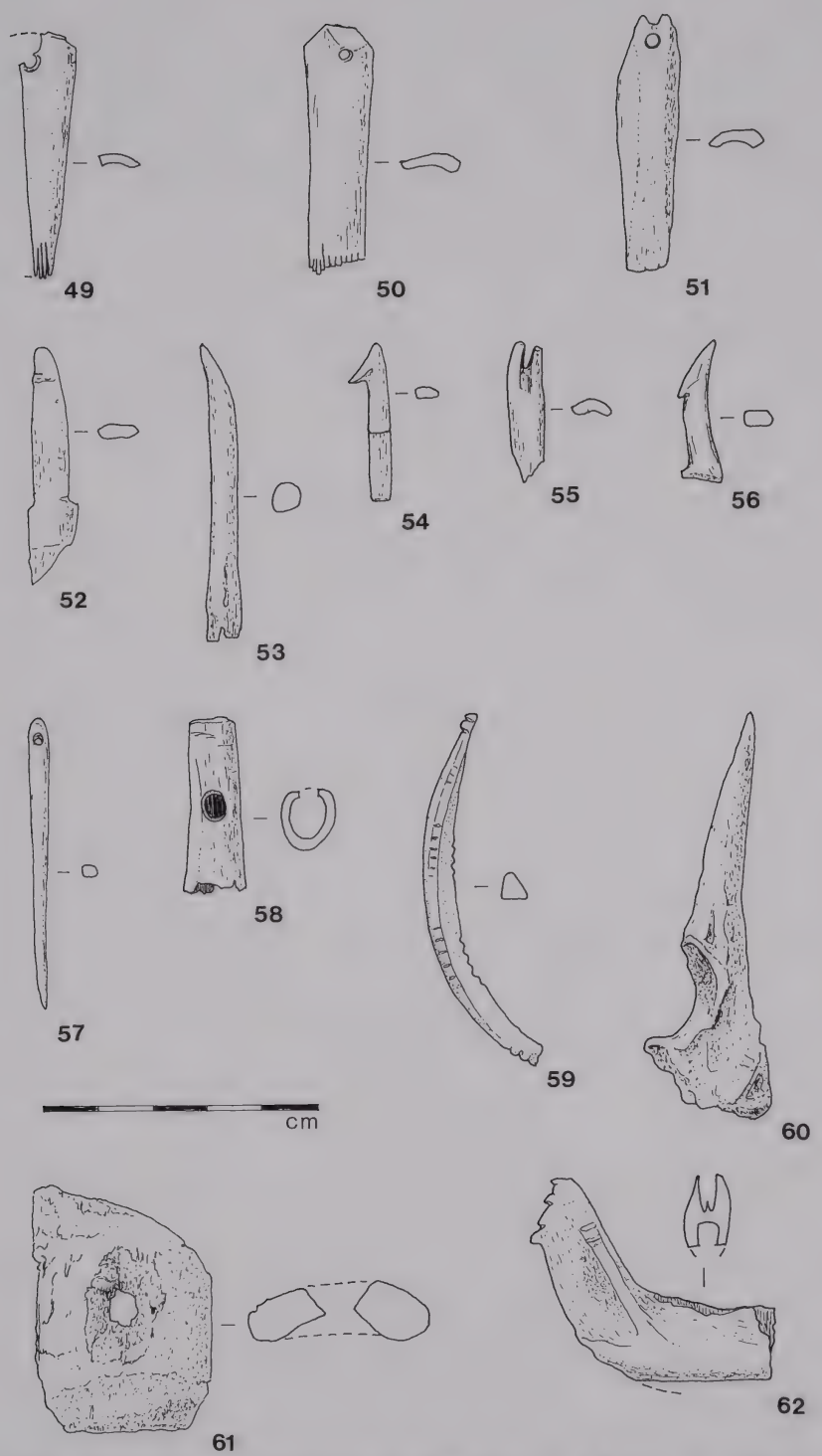
The dog mandible, AR7653e from Square N105, consists of the jaw angle, with the lower part of the ramus and the anterior jaw broken away. The lateral border has been removed. There are two or three cuts across the edge of the ramus behind the back teeth, AR7654b is the fragile remains of an alveolar process with the lateral border cut away. It is the jaw of a young dog or puppy.

A short piece of worked bone from Square O 104, AR7635 (Fig. 55) is notched at one end with two cutting grooves showing below the notch. The rounded blunt point has been broken off.

The bone toggle AR7632a (Fig. 58) came from Square O 105. It was roughly made by cutting around both ends of a piece of dog femur and then breaking it, but with no further finishing. Part of the wider end has been broken downwards with the toggle hole being on the opposite side to the indented part. It is functional but not well finished.

Also present in Square O 105 was AR7653d, a dog right mandible with the front of the alveolar process broken away and the ramus broken across. The ventral border has been cut away. Dog jaw AR7654d is also a right mandible but it consists of only the ventral border with the rest of the jaw broken away. The bone shows no sign of working. AR8220 is a small piece of flat worked bone now broken into several pieces.

AR7627 (Fig. 50) from Square P 105 is a bone tattooing chisel with the teeth broken away at the base. The body of the chisel is complete with a central hole but the upper portion is broken into four pieces. AR7632 (Fig. 56) is a small curved flat piece of bone with a barbed point at one end and a shoulder cut in one edge at the other — the point of a two-piece fishhook. AR7653b is a flat strip of worked bone polished all over and broken at both ends, from Square Q 105.



Figs. 49-62. Bone and shell artefacts. 49. AR7628. 50. AR7627. 51. AR7629. 52. AR7634. 53. AR7637. 54. AR7633b. 55. AR7635. 56. AR7632. 57. AR7636. 58. AR7632a. 59. AR7630. 60. AR7638. 61. AR7631. 62. AR7640.

Bone from Square R 105 consisted of a bone needle, AR7636 (Fig. 57). It is in good condition with the eyelet hole bored from both sides. The fragile barbed point AR7633b (Fig. 54) has a low shoulder about half way down the flat side of the shaft reducing the thickness of the bone to form a lashing shoulder. The opposite side has a series of fine cuts probably to roughen the polished bone and act as a lashing grip. The barb protrudes almost at right angles to the shaft and its upper side merges into the point. The artefact is a delicate piece and could not have been used for anything requiring a great deal of pressure.

AR7634 (Fig. 52) is a flat sliver of bone, polished on both sides at one end, but with the bone lacunae showing at the other end where it has been snapped across. It has a rounded point with two incised cuts across both surfaces just below the point. Towards the broken end the bone has been notched on both edges form a shoulder. Its use is unknown.

AR7630 (Fig. 59) is made from the rim of a paua (*Haliotis iris*) shell. It is curved and triangular in cross-section and is decorated with a series of notches in groups on the main body. One edge angle has two groups of six notches with a group of three near the proximal end. Another angle has two groups of five with three near the line attachment and the third angle has two groups of four notches with additional ones near both ends. The proximal end has a knob with two notches at its tip, and the distal end has a side shouldered, flattened hook attachment also notched for lashing. It came from Square R 105 Layer 2d. Similar lure shanks, but without notching, are illustrated by Crosby (1966:144) who described them as "Keri (sic) Island" late series shank types. They take their name from a shank found in a site opposite Kiri Island, Hauraki Plains, by Dr A.W. Avery of Thames. The cache included points which go with the shank. The form is characterised by a natural triangular section made from the columella of a paua. The line lashings are symetrical. Surface collections from a number of places including the far north and Slipper Island off the Coromandel east coast have included similar shanks (Janet Davidson pers. comm.), others have come from the Mokau Valley, Taranaki (Roger Fyfe pers. comm.).

A bone tattooing chisel, AR7629 (Fig. 51) is from the shaft of a bone with a central hole bored from one side in the upper portion. The lower part has been ground flat to form a chisel edge. The bone at the top, just above the hole has been broken away. It came from the long trench, Square T 102.

A worked strip of bone, AR7653a, from baulk V 104/105, has been cut along the sides and then snapped. One end has been cut at an angle and broken and the other end just broken. One surface has been smoothed but the under side is in its natural state. The thin end of the bone has been longitudinally grooved but the shallow groove only runs half way along the bone surface.

AR7638 (Fig. 60) is an awl made from a dog left ulna. The upper joint of the bone has not been modified but the shaft has been broken in half down the bone and the end cut or ground to a point. It came from Square V 105. An unusual item from the same square, is an oval piece of very porous bone, AR7631 (Fig. 61) possibly of sea mammal bone, suggesting a fishhook tab. It has a knob protruding slightly from the oval outline forming an incipient snooding end. The whole piece has been cut out of the

bone and has an angular look. The central hole has also been cut through from both sides rather than drilled.

UNPROVENANCED ARTEFACTS AND SURFACE FINDS

A number of artefacts were gathered from outside the actual excavation during quarrying. They were mainly stone adzes, blanks and preforms and hoanga. The collection is probably very selective and articles made from other material such as bone or shell may have been overlooked.

A small collection of bone artefacts from the estate of Lawrie Birks is now in the Auckland Museum. Birks worked at the Taylor's Hill excavation and the artefacts were probably gathered during the quarrying operations. There are no notes associated with them. The Birks material is dealt with separately below.

Adzes

Adze AR7586 (Fig. 7) is a long narrow adze, sub-triangular in cross-section, with the back wider than the front. Although of archaic appearance, similar to Duff's (1956:180-182) Type 4B, it has a tapered rather than a modified butt. The back is slightly convex. The adze has been made by flaking and hammer-dressing followed by some polishing. It has been polished on the front and roughly polished on the bevel end of the back, and appears to have been heavily used before being abandoned as the blade has deep striations up its surface. It has been made from local greywacke. The adze appears to be slightly sand blasted.

AR7594 (Fig. 15) is a complete Duff Type 2B adze of grey-green greywacke. It is polished all over except where a few flake scars are too deep. There is no appreciable hafting polish. The bevel edge is fairly straight and there are a number of tiny edge chips across it indicating use wear. The bevel shoulder is slightly rounded.

An unusual complete small adze, AR7592 (Fig. 12) has been made from a hollow-veined sedimentary, cherty material, badly degraded and corroded. It is of a stubby Type 2B form and has been shaped by grinding all over except where the butt end and side have crumbled away. The bevel edge is rather irregular and fragile as the fissures in the stone have prevented a properly formed edge.

AR7611 (Fig. 33) is a small fine-grained greywacke adze made from a pebble by flaking and hammer-dressing. The adze has been partly polished and the bevel angle is curved. The front has had a couple of large flakes broken off from the blade end upwards and sideways. Some attempt has been made to regrind the broken area but this was not continued. There are patches of pink marine encrustation over one surface.

AR7609 (Fig. 31) is of medium-grained greywacke. It has been made from a flake and then worked to form a rough adze shape. The blade edge is bifacially polished and flattened suggesting that it has been used as a grooving tool rather than an adze.

AR7597 (Fig. 19) is the butt end of a Type 2B fine-grained greywacke adze, hammer-dressed and then polished. The broken end has been reflaked with the front subsequently hammer-dressed and the back roughly flaked.

AR7599 (Fig. 21) is an adze of coarse crystalline greywacke with a broken bevel. It is probably made from a pebble and the stone is fairly intractable. It has been roughly flaked and slightly polished. The blade end has been reformed by flaking, with bevel polish uncompleted. It may have been a larger but broken adze, subsequently reworked.

AR7601 (Fig. 23) is the blade end of an adze preform of fine-grained greywacke. It is quadrangular in cross-section and has been carefully flaked. The back has been hammer-dressed along its surface and on to the bevel shoulder, and the other sides have been partly hammer-dressed. It was probably broken during the process of hammer-dressing. The bevel end is slightly wider than the body giving the end a flared look.

AR7593 (Fig. 14) is the broken bevel end of what appears to have been a sub-triangular cross-sectioned adze. It is made from grey-green greywacke. An attempt has been made to rework the blade along one side and the bevel end by the removal of a number of flakes. The side of the polished front nearest the flaking has been heavily hammer-dressed to the edge of the secondary flaking over the old polishing. It is probable that the reworking and hammer-dressing broke the adze.

AR7595 (Fig. 16) is a bun-shaped block of basalt, flattened and polished on one side and heavily bruised along the sides and top. Both ends are flat but the wider end has been hammer-dressed and a large flake has been struck from the flat underside rendering the stone useless for further development. It may then have been re-used for hammer-dressing.

The blade end of an adze AR7600 (Fig. 22) is made from grey-green fine-grained greywacke. It is bun-shaped in cross section with a flat unworked front except for a small polished facet, and is flaked and hammer-dressed with slight polishing on the back. The bevel shoulder has been formed by removing a number of flakes from the bevel edge. It may have been reworked.

AR7649d is a possible blade end of an adze blank formed by flaking and heavy hammer-dressing. The front has been flaked and the back heavily hammer-dressed. The rough blade edge has been crushed as if used for pounding or bruising.

AR7650a is the blade end of a flaked fine-grained greywacke blank. It was formed by the removal of numerous small flakes leaving the stone irregularly shaped. The bevel has been formed by flaking and there is light hammer-dressing in a few places.

AR7649b is an intractable piece of fine-grained greywacke worked stone with an oval cross-section. It has been formed mainly by flaking and the sides have been hammer-dressed. It probably broke during preparation.

AR7650b is the butt end of a fine-grained greywacke preform with slightly 'waisted' sides. The flaked outline has been hammer-dressed over three sides and to a

limited extent on the fourth. One edge of the broken portion has been deliberately bifacially flaked and re-used.

AR7649c is one end of a flaked blank of medium-grained greywacke, bun-shaped in cross-section. It has a flat flaked base heavily hammer-dressed along one side and the 'crest' or upper surface has been slightly bruised. The broken end is slightly angled and the protruding lower edge has been used for cutting or sawing. At the end opposite the break several flakes have been removed back and upwards from the flat base leaving a curved edge around the end.

Fishing sinker, hammerstone, etc.

Stone fishing sinker AR7623 (Fig. 45) is an oval andesite stone from Waiheke with a pecked groove around its circumference.

AR7618 (Fig. 41) is a basalt hammerstone probably of local origin. It is flat on one side, possibly as a result of grinding, concave on the other and flattened around the circumference. The granular nature of the stone prevents the edge bruising from showing obviously but it may have been well used.

AR8201 is a large flake of coarse-grained greywacke. The edges are irregular but it does not appear to have been used. It is probably an adze reduction flake.

Hoanga

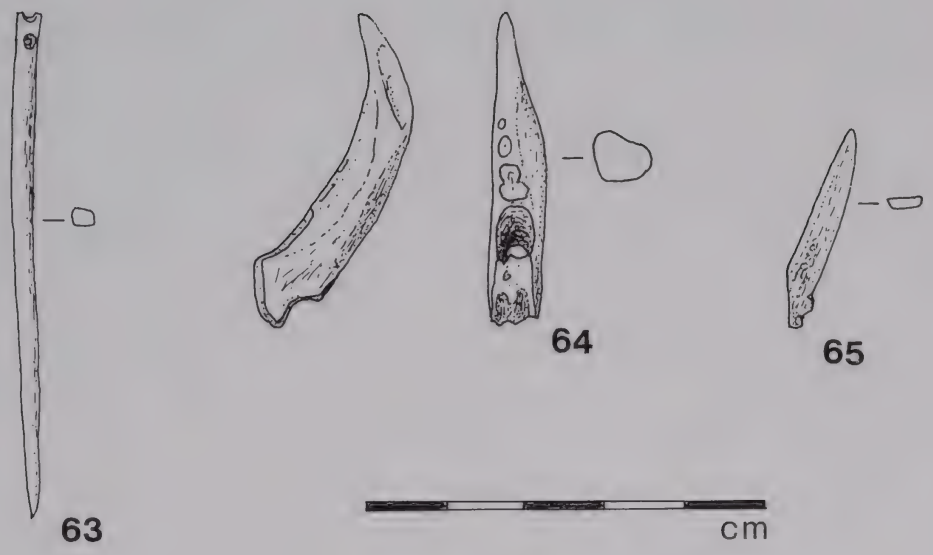
AR7624 (Fig. 46) and AR7651d represent two parts of a long, prepared flat piece of fine-grained local sandstone which, when joined, make an elongated and concave grinding surface. AR7624 appears to have had further use after breaking while the other piece was discarded.

AR7652 is a large triangular shaped piece of coarse-grained sandstone with one surface slightly concave from use and some grooving marks at one end. The sandstone is not from the immediate neighbourhood. It is possibly from south Auckland or the Kaipara area.

AR7615 (Fig. 37) is a smooth oval greywacke stone about the size and shape of a bantam's egg with one end artificially flattened. The flat surface is darker than the rest of the stone and gives the appearance of having been stained with an oily substance. It is stated as coming from Trench A but there is no other information on it. It may be a polishing stone with the flat surface being used for fine tool dressing.

The Birks collection

AR7633.1 (Fig. 64) is the point of a two-piece fishhook cut from the mandible and a part ramus of a puppy or young dog. The two small back molars have been filed level and a more forward molar removed leaving an empty socket. Behind this socket the bone has been cut and fashioned to form two lashing grooves so that the socket and the grooves form an attachment arangement for the shank. The cut and shaped ramus has been ground into the point of the hook.



Figs. 63-65. Birks collection. 63. AR7633.2. 64. AR7633.1. 65. AR7633.3.

AR7533.2 (Fig. 63) is a thin well-polished bone needle. The original eye has been broken and a fine lower eye, bored from both sides, has replaced it.

AR7533.3 (Fig. 65) is a small bone sliver, probably a point for a two-piece fishhook. One end is pointed and slightly polished and the other end has two notches for lashing.

AR7533.4 is a broken short flat strip of bone with two angular cuts at one end. The other end has been snapped. The underside of the bone has a shallow longitudinal groove cut into it. AR7533.5 is a piece of the shaft of a bone broken at both ends and AR7533.6 is an apparently unused dog canine.

Discussion

The artefacts from the N-W area and those from the unprovenanced collections are varied and some are representative of the type of material found in many late pre-European sites. Many of the adzes had been reworked and modified after breaking to form smaller adzes, pounders and other items so that the original styles have been obscured. Numerous greywacke flakes indicate adze manufacture or reworking but few stone cores were found. The few argillite flakes present were carefuly re-used suggesting that the material was valued. The greenstone chisels were small and well used.

There were a number of obsidian flakes but no cores. About 20% of the flakes throughout the site were utilised. The largest concentration of obsidian came from the Terrace B area, mainly in the upper layers of Squares O and P 105, Q and R104 and

Q 105, suggesting that the terrace was once an area of industrial activity for obsidian flaking (Brenda Sewell pers. comm.).

Careful use was being made of residual stone material present on the site with many artefacts being reworked or reused. This could suggest restricted access to sources beyond the local area, possibly during the politically disturbed late eighteenth and early nineteenth century.

The adze of Duff's Type 4B and the bone fishhook tab are the only items suggestive of an archaic or early occupation although there is a variety of adzes that were not typical of the 2B quadrangular type.

Most of the stone material came from local sources i.e. Motutapu or Waiheke Islands, but stone from Coromandel is also well represented.

FAUNA AND FLORA

Dog and other mammal bone

Numerous dog bones were found in the excavation. These have been analysed as one collection by Ian Smith, Anthropology Department, University of Otago.

Smith comments that the minimum number of dogs present was seven: one pup, two sub-adults, three sub-adults and/or adults and one adult. All parts of the dog carcasses were present suggesting that they were killed and butchered on the site. The most frequently occurring elements were radii, ulnae, tibiae and pelves. All are meat yielding parts of the body. However, there were small numbers of scapulae, humeri and femora and these also yield good meat cuts. Smith (1981:98-99) notes that patterns similar to this have been observed elsewhere. Possible explanations for this could be: loss of bones through breakages; use of humeri and femora for making artefacts; or the sharing of dog carcasses in the manner suggested for Pig Bay (Smith 1981:98-99) with some of the best cuts being eaten or disposed of elsewhere.

The other major items of interest in this collection are the dog mandibles. At least ten complete or partial right or left half mandibles show evidence of either the ventral border or ramus having been cut from the mandible body. The ventral portion is known to have been used for making points for composite fishhooks and it is probable that these represent the residue after the thick bases were cut or broken away.

Other bones identified were a few fragments of sea mammal, probably dolphin, and lamb bone from T 102.

Bird, fish and rat bone

Identification of this material was done by R. McGovern-Wilson of the Anthropology Department, University of Otago. These bones have also been treated as one assemblage although some of the bones are localised to specific layers and squares. Identifications are listed in Tables 1 and 2.

Table 1. Taylor's Hill bird identifications.

Square	Birds
N 104	pukeko (*Porphyrio melanotus*)
O 104	pukeko; Australasian harrier (*Circus approximans*)
O 105	little blue penguin (*Eudyptula minor*); grey duck (*Anas superciliosa*)
Q 104	Australasian harrier; N.Z. pigeon (*Hemiphaga novaeseelandiae*); little blue penguin
T 103/104	teal (*Anas* sp.); tui (*Prosthemadera novaeseelandiae*)
Trench A	Australasian harrier; kaka (*Nestor meridionalis*)
Trench C	kaka

Table 2. Taylor's Hill fish identifications.

Fishes	minimum number
Snapper (*Chrysophrys auratus*)	37
Trevally (*Caranx lutescens*)	1
Conger eel (*Conger verrauxi*)	1
Barracouta (*Thyrsites atun*)	2
Ray (*Dasyatis* sp.)	1
School shark	1

Shells

The most common shells mentioned in the field notes were cockles (*Austrovenus stutchburyi*) with some pipi (*Paphies australis*) and scallops (*Pecten novaezelandiae*). All of these can be gathered locally. A small amount of shell from the excavation has survived (Davidson pers. comm.). It represents four "midden samples" consisting entirely of small cockles and seventeen small bags of individual, obviously selected shells. Because of the highly selective nature of this sample no analysis has been carried out.

Another three small bulk samples were analysed in Canberra in 1963 under the direction of W.R. Ambrose, as part of a wider study of shell samples from New Zealand excavations. The results have been converted to percentages and are presented in Table 3.

In the original analysis, numbers and weights were listed for entire shells, broken individuals, and fragments. Minimum numbers have been calculated for each species by combining the numbers of entire and broken individuals and, in the case of bivalves, dividing by two or, in the case of *Pecten novaezelandiae*, where upper and lower valves were distinguished, taking the larger number. The weight in grams for each species combines all recognisable pieces of that species.

Table 3. Percentage composition of shell material in midden samples by number and weight (g).

Sample number	65		66		67	
	n	wt	n	wt	n	wt
Paphies australis	2.0	2.6	0.7	0.2	3.8	3.0
P. subtriangulata	0.4	1.4	0.2	x	0.2	0.2
Austrovenus stutchburyi	73.9	60.1	94.6	91.8	93.9	94.0
Cyclomactra ovata	1.6	4.1	0.2	0.3		
Mytilus sp.	0.8	1.3	0.7	1.8	0.2	0.2
Pecten novaezelandiae	8.6	20.1	1.1	5.0	0.2	2.0
Ostrea sp.	1.2	2.9	0.2	x	0.2	x
Amphibola crenata	4.1	1.9			0.2	x
Cominella sp.	2.8	2.2	0.4	0.3	0.4	0.3
Turbo smaragdus	3.2	2.6	0.4	0.2	0.2	x
Nucula hartvigiana	0.4	x	0.2	x		
Maoricrypta monoxyla			0.2	x		
Sigapatella novaezelandiae			0.2	x		
Pomatoceros caerulens			0.2	x	0.2	x
Chiton			0.2	x	0.2	x
Zediloma sp.	0.4	0.1				
Struthiolaria papulosa	0.4	0.2				
unidentified gastropod			0.2	x		
unidentified fragments		0.1		0.2		x
Total number	245		447		444	
Total weight		839.6		990.4		1059.1

x = trace only, >0.1%.
Sample 65: Square V 105, pit Layer 4C. Sample 66: Square T 104, top of pit fill. Sample 67: Square O-Q 104, Layer 3.

Sample 65, from what is thought to be an early context, shows a somewhat greater diversity, whereas samples 66 and 67 show a heavier reliance on *Austrovenus stutchburyi*. The samples are two small and two few, however, to read any great significance into their composition.

The Canberra study also involved measurements of complete valves of *Paphies australis* and *Austrovenus stutchburyi*. The resulting size frequency histograms appear to reflect a smaller population of *Austrovenus stutchburyi* in sample 66, compared with the other two samples.

Flora

Wood and charcoal samples from the site were analyused by Rod Wallace and the results shown in Table 4. He suggests that Taylor's Hill was near a broad-leafed forest dominated by puriri whereas a short distance south the Maungarei (Mt Wellington) area showed a more open environment with bracken and regrowth scrub.

coastal sand-dune tiger beetles were related to the colours of the sands in different areas.

In general (see Figs. 2, 3-10), dark specimens similar to those described as *Cicindela campbelli* Broun, 1886, occurred on the black ironsands of the west coast beaches near Auckland and further south. The species accepted as *Cicindela perhispida* Broun, 1880, with reduced thin dark areas on the elytra, was from further north on the west coast cream sands and the subspecies *Neocicindela perhispida giveni* van Nidek, 1965, with dark areas almost completely reduced was on pale sands of the northernmost and eastern beaches of the far north. *Cicindela brevilunata* Horn, 1926, with bold but reduced dark areas, occurred on whitish sands south of the Whangarei Harbour on the east coast. Pinkish-brown sand on the intervening north-eastern coasts did not provide tiger beetles.

Further, because of apparent mis-labelling and/or mis-recording, there had been a confusion of the species names and localities in earlier years in regard to the *perhispida* of Broun (1880) occurring at Hokianga (on the west coast) and Marsden Point (south of Whangarei Harbour on the east coast) and to *brevilunata* of Horn (1926b) also occurring at Hokianga. Both Hudson (1935) and Horn (1936) had continued this confusion. Because neither Broun (1880) nor Horn (1926b) designated type specimens in their papers and because Horn (1936) recorded having a Hokianga specimen taken from Broun's collection in the British Museum there was a distinct possibility that the names of the two species could be exchanged. Consequently it was deemed necessary by the author to consider the taxonomic position of these two species which would require examination of types and other specimens in overseas museums. Subsequently this was done in 1987. Further collecting started in January 1988, during the 1987-88 summer season, has revealed further distributional and seasonal information for the entities concerned. The results of these studies are reported here.

HISTORICAL RECORDS

Biographical notes

This list starts with Capt. Thomas Broun who studied New Zealand beetles for at least 45 years and published extensively. Two people who follow (Cheeseman and Campbell) are credited by Broun with collecting early specimens he described. The next four persons were later Broun contemporaries who also collected coastal tiger beetles and the last three were later collectors.

Thomas Broun (1838-1919) was a professional soldier when he first arrived in New Zealand. Later he was both an amateur coleopterist and professional entomologist as well as a farmer and a schoolteacher. His first published paper on New Zealand Coleoptera was read before the Auckland Institute in May 1875, and many more followed.

Broun apparently started teaching (at Tairua, east of Auckland) in 1876 (Cheeseman 1920) and he moved to the Whangarei Heads area (on the northern side of Whangarei Hbr.) in 1877 (Broun MS. letters in Auckland Museum library). As the printing of his Manual (Broun 1880) had been authorised in 1877 (Hector 1880), he

NZ 7770 charcoal
Delta 13C: -26.4 +- 0.1%
Conventional radiocarbon age: 396 +- 46 yr BP
Calibrated age range at 95% confidence: AD 1447 to 1635
Calibrated age range at 68% confidence: AD 1456 to 1521 (41%)
AD 1576 to 1626 (28%)

This sample came from a remnant of the early scoria, ash and charcoal layer through which Pit T was dug. The pit had an embrasure in the north wall filled with the ash layer and at the base of this the sample was gathered. The charcoal was identified as predominantly puriri (*Vitex lucens*) twigs, with small amounts of *Coprosma* sp., mapau (*Myrsine australis*), and pate (*Schefflera digitata*), and regarded as extremely suitable for dating (Rod Wallace pers. comm.).

NZ 7753 cockle (*Austrovenus stutchburyi*) shell
Delta 13C: 1.0+- 0.1%
Conventional radiocarbon age: 670 +- 50 yr BP
To compare this date with the dates reported against the New Zealand shell standard the local correction for ocean reservoir effect needs to be deducted. This is 336 years, shifting the date to 334 +- 50 yr BP.
Calibrated age range at 95% confidence: AD 1521 to 1795
Calibrated age range at 68% confidence: AD 1568 to 1695

This sample came from the lowest layer of fill in the large Pit V, just above the floor of the pit in Square V 105.

Although both samples came from the bases of pit fills NZ 7770 appeared to be material which had slumped into Pit T from a layer predating the construction of the pit, whereas NZ 7753 represented the initial filling of the large Pit V after its abandonment. In this interpretation, NZ 7770 probably dates the initial occupation of this part of the site, whereas NZ 7753 represents the closing stage of the occupation which involved construction and use of the very large pit on the platform. This result is almost identical to results for the main occupation of Mount Wellington, which also involved the construction of large pits (Davidson pers. comm.). The dimensions of Pit V are comparable to those of pits uncovered during excavations on Mount Wellington by Golson (1960) and Davidson (pers. comm.).

Initial occupation of the eastern ridge of Taylor's Hill may have begun earlier than, or about the same time as the first occupation of Mount Wellington. A major period of pit construction and use appears to have taken place at about the same time at both sites.

CONCLUSIONS

Archaeological excavations at Taylor's Hill suggested three periods of occupation:

1. The building of the platform, digging of pits and various other activities;

2. the addition of the northern terraces with steep scarps, one cutting through an earlier midden deposit; and

3. the filling in of the terrace pits and possibly some on the platform and the modification of the outline of the terraces, naturally and/or deliberately.

There could have been periods of abandonment of the site during this sequence but there was no evidence for this.

A surprising number of artefacts were found despite the fact that excavations were peripheral to the main pa. These artefacts have been treated as one assemblage as their stratigraphic position is not always clear.

There is evidence of adze preparation on the site. Most of the adzes are undiagnostic in form but the reworking of a number overshadows their original shape. There are a few Type 2B adzes. Some adzes suggest an earlier style such as the Type 4B from the surface collection and a few broken blades. The curious fishhook tab reflects the archaic period but the material it is made from and its preparation by cutting rather than drilling and grinding makes it an anomaly. No drill points, apart from the hand held one were found.

Many adzes show elements of reworking and re-use. Some stubby adzes are the result of reworking larger broken ones. Later occupants re-used discarded pieces, possibly because of lack of access to sources or trade even at a fairly local level or because the site was only used spasmodically. Excavations at the Fisher Road, Tamaki, living sites (R11/887,888 and 889) also produced a number of reworked adzes (Foster and Sewell 1989:18) so that this re-use was not specific to Taylor's Hill.

The presence of a number of debitage greywacke flakes suggests that at one stage adzes were made or reworked on the site, probably from imported cores although only one core was found. This adze preparation may have occurred during the earlier occupation and the re-use of artefacts later.

Most of the stone came from local sources, i.e. of Hauraki Gulf origin from the Waipapa groups of meta-greywacke, but there are a number of items which originated in Coromandel suggesting contact with people from that area.

Many items were roughly made and for everyday use, for example, tattooing chisels and the bone toggle. There was little apparently made by specialists or for ceremonial occasions. It is possible that the better quality material was elsewhere, such as the main portion of the pa, or else it was removed as people came and went.

Food production and gathering involved kumara gardening, fishing, shellfish collection and bird hunting. Dogs were also important. Timber working and earth digging were represented by stone tools.

The presence of pits for food storage (probably kumara) indicated that gardening was carried out around the site. Later many of the pits were filled in. This could suggest that storage pits were rebuilt in other areas when the early ones were no longer

suitable for storage or that the local soil had become exhausted. Although the pits show that some roof supports required shoring up over time, post repairs were not excessive suggesting that the structures were either well built or not used for very long.

Food collection activities indicate that only a few bird species were exploited. Fishing was important and snapper predominate. This species is the most common in a number of Auckland sites. Cockles were the most numerous of the local shell fish gathered. The quantity of dog bone remains suggests that dogs were important both as food and in tool manufacturing.

The radiocarbon dates indicate an occupation period between the 15th and 17th century A.D. for the platform. From these dates and other aspects of the excavation it could be suggested that the first occupation of Taylor's Hill occurred during the period described by Green (1963:99-100) as the "proto-Maori phase" *ca.* 1450-1650 A.D. and that similar activities were also occurring on nearby Maungarei (Mt Wellington) over that time.

The site probably continued to be occupied through the 'Classic Maori' period as much of the material from the site is similar to that described by Davidson (1978:5) as associated with that period. It is probable that the site continued to be used, possibly spasmodically, to the end of the 18th century, after which it was abandoned.

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Caroline Phillips produced the site plan from several sources and pieced together a number of uncompleted field drawings to produce the long section and floor plan, without which the writing of this report would have been difficult. Dr Susan Bulmer, Department of Conservation, supplied a copy of the recent site plan of Taylor's Hill, prepared by David Bulmer.

Ian Smith, University of Otago, prepared a detailed analysis of the dog and other mammal bones in the site and Richard McGovern-Wilson of the same institution analysed the fish bone. Kathy Prickett and Dante Bonica analysed and discussed the stone sources and Brenda Sewell examined the obsidian. Charcoal was identified by Rod Wallace, Anthropology Department, University of Auckland.

Janet Davidson read and commented on the draft report and summarised the Canberra shell study. Professor R.C. Green, Anthropology Department, University of Auckland, allowed use of some of the Taylor's Hill archival photographs. The Carbon 14 dates were obtained with the assistance of the Lottery Science Distribution Committee as part of a wider dating project organised by Janet Davidson. Jack Golson allowed the use of his material to enable this report to be written and commented on the draft. Shell samples were analysed by Wal Ambrose. Nigel Prickett and the Auckland Institute and Museum supported the production in a number of ways.

Footnote. Jack Golson would like to add that he was delighted to make available his field notes and excavated materials to allow this report to be written and warmly thanks the author and her colleagues for all their effort.

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JACOB WILLIAM HEBERLEY OF WELLINGTON: A MAORI CARVER IN A CHANGED WORLD

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Abstract. The life and work of Jacob William Heberley (1849-1906), Maori carver of Wellington, is examined as one example of the way in which Maori carving made the transition from a tribal art to a modern commercial art. Jacob's family relationships are traced in order to establish the precedents of his art style. It is concluded that Jacob was basically self-taught. Unlike the carvers who made the transition to the modern world by working in a tribal carving school, Jacob worked alone serving mainly European patrons, especially the politicians and collectors of Wellington. Much of his carving was commissioned as official government gifts to visiting royalty. Twenty-two documented carvings by Jacob are described and distinguished from the work of other contemporary carvers. On the basis of this examination, a further 55 items in public and private collections are attributed to the hand of Jacob Heberley. Jacob taught his two nephews, Herbert and Thomas to carve and their subsequent careers are briefly traced, including Herbert's work on a meeting house at Riverhead, Auckland and Thomas's employment as a carver at the Dominion Museum, Wellington.

New Zealand Maori woodcarving is one of those few exceptional "ethnic arts of the fourth world" (Graburn 1976) that have made a successful transition from an indigenous tribal world into the modern world of commercial development, while retaining many features of the original art-form and still meeting some of the needs of the original ethnic group. In New Zealand during the nineteenth and early twentieth centuries, this transition was achieved in two different ways, either by carvers working within an established communal tribal school or by individual carvers working in isolation away from any community of tribal carvers.

In those areas of the country where woodcarving traditions survived into the later part of the nineteenth century, it was generally carvers working within those traditions as members of a communal school who made the transition. This was the case especially around Rotorua, but also in the Urewera, along the lower Wanganui River, and on the East Coast down to Gisborne and northern Hawkes Bay. As the European commercial world penetrated further into these tribal worlds, some of these carving schools managed to span both worlds, continuing to produce art for their own people and additionally for the demands of commercial transactions. Most successful among these were various Arawa carving schools especially Ngati Whakaue, Ngati Pikiao and Ngati Tarawhai, catering for the demands of the tourist trade around Rotorua (Neich 1977; 1983). To a lesser extent, the Rongowhakaata carving school of Poverty Bay and the Waiapu Ngati Porou carving school of the northern East Coast also began to produce items for sale and as commissions in the commercial scene.

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Individual carvers working in isolation did sometimes practise in the areas dominated by the traditional communal schools, or at least managed to maintain some degree of independence from the community of carvers. An example is Tene Waitere of Ngati Tarawhai (Neich 1990). However, it was especially in those areas of the country where the traditional communal schools of carving had declined or disappeared that the individual carver was able to make his own impression on the nature of this transition. Some of these individual carvers had been traditionally trained in the old schools but had then branched out into the commercial scene on their own initiative. Patoromu Tamatea and Ihakara (Aukaha) of Ngati Pikiao are such individuals, as will be explained below. Others had not come through a traditional school but were self-taught, developing their own distinctive individual style, and supplying their own market. Jacob Heberley (1849-1906), the Wellington carver whose life and work are described in this article, was a prime example of this latter type of development (Fig. 1).

Fig. 1. Jacob Heberley of Wellington. Photo: National Museum.

Apparently self-taught and with only tenuous historical links to an extinct ancestral Te Ati Awa carving tradition, Jacob forged his own distinct carving style that he applied to all sorts of innovative objects, as well as to replicas of traditional objects then totally obsolete in the life around him. Most of Jacob's production was for prominent Europeans, either resident in the Wellington area or for distinguished visitors to New Zealand. Jacob and his work were known personally to such people as Sir Robert and Lady Stout, Richard John Seddon, Sir Walter Buller, Alexander Turnbull, Lord Ranfurly, T.E. Donne of the Government Tourist Department, Sir Julius Vogel and Sir Joseph Ward. Among these prominent Pakeha New Zealanders, Jacob was known by the English version of his name, but among his family he was also addressed by the Maori version of Hakopa Heperi, and his wife Sarah apparently sometimes used Heperi as her surname. Although he never seems to have been involved in major carving projects for Maori people, several of his smaller items such as walking sticks and ceremonial handclubs did become accepted and were passed on as tribal heirlooms by prominent Maori personalities among various tribal groups. Most importantly, through his work, Jacob played a major role in contributing to the acceptance of contemporary Maori woodcarving as a powerful expression of New Zealand's national identity, regarded as an appropriate gift to visiting royalty and other distinguished visitors, or to be featured as a decoration for New Zealand's stately homes.

BIOGRAPHICAL BACKGROUND

Jacob was the son of James Heberley, an English/German whaler of Queen Charlotte Sound, and his Maori wife variously known as Te Wai, Mata Te Naehi, Mata Te Naihi or Te Wai Nahi (Fig. 2).

James was born in Weymouth, Devon in 1809 of a German father and English mother and went to sea at the early age of ten or eleven. After many adventures in various ships including whalers in the Pacific, James settled at John Guard's whaling station at Te Awaiti, Queen Charlotte Sound in 1830 (Heberley 1947; MacDonald 1933; Stratford n.d.). Here, James found himself in the midst of continuing skirmishes between Te Rauparaha's Ngati Toa and the peoples of the South Island. At first he had to live in a Maori raised storehouse or whata and soon became known as 'tangata whata' which was corrupted to Worser, the nickname he bore for the rest of his life. Present day family members relate this nickname to his habit of warning that the weather would get "worser and worser".

Later in the same year of 1830 or early 1831 James took a Maori wife as he described in his memoirs:

> ". . . in Port Underwood, it was there I took a wife I bought her for a blanket, she was not a slave, it is a rule to give something to their friends, I then took her to Te-Awaite, and she has reared a large family, we got married as soon as the missionary came amongst us the name of the missionary was Ironside, . . . "
> (Heberley 1947:20)

In his memoirs, James himself gives very little information on the tribal origins or connections of his wife. At one stage when James and his family were staying at Kapiti, the intertribal fighting became so dangerous that "I took my boat and two

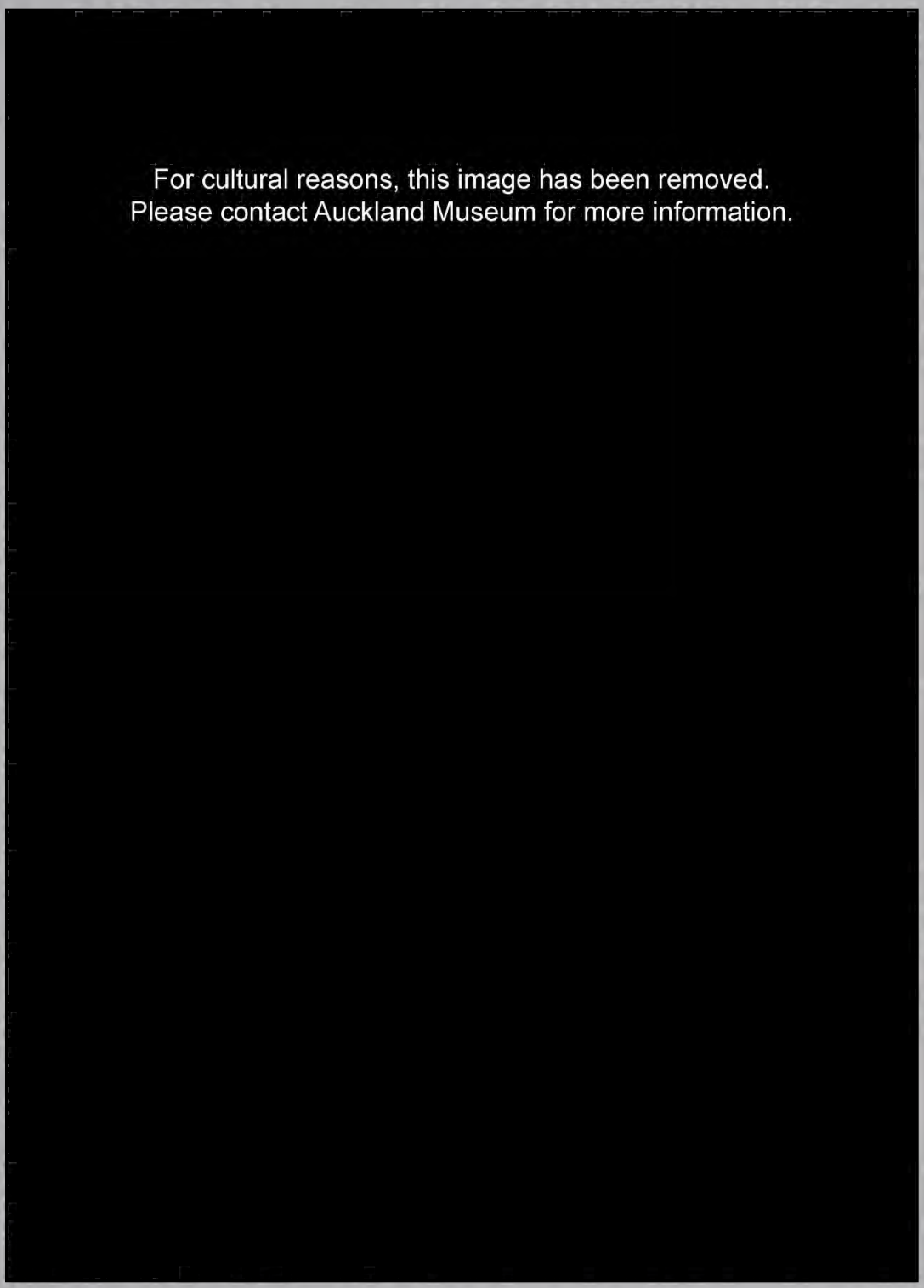


Fig. 2. James Heberley and Te Wai. Photo: Alexander Turnbull Library.

natives to pull with me to a place called Waikinie [Waikanae] to land my wife and child among her own tribe" (Heberley 1947:22).

The people of Waikanae belonged to the Ati Awa tribe, as did the Maori of Wellington and Queen Charlotte Sound, having settled in all these areas since their migration from northern Taranaki with Te Rauparaha and his Ngati Toa, in the 1820s.

In evidence given before the Land Claims Commission in June, 1843, James made the following statements:

> "I am married to a Native woman. I arrived in Queen Charlotte Sound in the "Waterloo" schooner 15 years ago and I have lived from that time to the present with my Native wife E Wai by whom I have had four children, all of whom are now living, the three eldest having been baptised by Mr Ironside the Wesleyan missionary. Eldest is named Margaret, 2nd John, 3rd Sarah. The youngest boy is not yet baptised. He is 14 months old . . . My wife's friends lived at Pepitia [Pipitea?] and she is related to the chiefs of the tribe there. John Pukekura came to me in the Sounds about 4 years ago — he said that if I would come and live at Pepitea he would give me land to cultivate for the children. He did not tell me how much but said it would be at Pepitia . . ."
>
> (OLC. 1041. National Archives)

On the same file are copies of the baptism and marriage certificates signed by Rev. Samuel Ironside. On the marriage certificate his wife is described as "Te Wai a New Zealand female."

From other sources, the Ati Awa origin of James's wife can be confirmed and her name is variously given as Te Wai, Mata Te Naihi, Mata Te Naehi, Te Nahi, or Te Wai Nahi. However, the exact tribal genealogical relationships of Te Wai have remained something of a mystery to her living descendants, despite intensive archival research on their part (Thessman 1988). These family connections of Te Wai are also of interest for our study of Jacob as a Maori carver, for the light they may shed on the antecedents of his art and the possible identity of any carving teacher who may have inspired him.

Recorded Maori relatives of Te Wai include John Pukekura of Pipitea, Kopurie also probably of Pipitea (OLC. 1041, National Archives), and Ropoama Te One who gave James some land in Tory Channel (OLC. 1041, National Archives). James also stated that he was given land at Worser Bay, Wellington in 1843 by his wife's uncle and grandfather, but without being clear whether these were the same as any of the individuals named above (Heberley 1947:40; MacDonald 1933:117). Another source (Neville Gilmore, Department of Maori Affairs, pers. comm. to Mrs Miriam Heberley) stated that Mata Te Naihi was a cousin of Haneta Toea who was married to Ropoama Te One. There has even been a suggestion, current among some Heberley descendants and reported in the archives of the Church of Latter Day Saints (Mormon) Genealogy Centre, Hamilton, that Te Wai was a daughter of Honiana Te Puni, a prominent chief of Te Ati Awa at Petone, but this is very unlikely. Another family record states that Mata Te Naihi belonged to the Ngatiwhirikura hapu of Te Ati Awa, based at Waikawa, Picton.

An important mention of Te Wai or Mata Te Naehi located in official records occurs in a genealogy from a Wellington Maori Land Court sitting of 27 February 1888 (Fig. 3). The notes to this genealogy state that Mata Te Naehi went to Arapawa, presumably Arapawa Island in the Marlborough Sounds and died there. She had married a European and gave birth to Mere Maki who also married a European. The relevance of this genealogy for an understanding of Te Wai's ancestry is still somewhat unclear (Thessman 1988), although Mrs Miriam Heberley (pers. comm. 6 March 1990) has pointed out that Mere Maki is another name for Mary-Ann Heberley, also known as Margaret, the first-born child of James and Te Wai. Mary-Ann was born at Queen Charlotte Sound in 1832 and married a European named Robert Woodgate on 5 July 1854. Therefore this genealogy does seem to agree with other information on Te Wai although it does not really help with an understanding of her status and hapu affiliations within Te Ati Awa.

Another Land Court record (Fig. 4) locates Mata Te Naihi within an extended version of this same genealogy, although there are some differences in the details of names and relationships.

The name of Mata Te Naihi's mother has been spelt variously in family records and land court minutes as Manupoingu, Manukoingu, Manukanga and Manukoma. An unreferenced 1923 newspaper obituary of Mrs Elizabeth Love, who was the daughter of Margaret Heberley and Robert Woodgate, mentioned that "her great grandmother was a famous member of Ngati Awa tribe Manukanga who fought against the Wanganui tribes".

Ropoama Te One who is mentioned as a relative of Te Wai was a prominent chief of Te Ati Awa residing at Queen Charlotte Sound. He was well known to people such as Sir Donald McLean and Reverend Octavius Hadfield. Ropoama was considered by these people as an important potential chiefly influence in the Waitara land dispute but his absence from Waitara precluded the exercise of any effective authority (Sinclair 1951:62). Whatever the details of Te Wai's whakapapa, she clearly had important chiefly connections that would have provided her children with access to the support and teaching of other high-ranking Te Ati Awa, including any practising carvers.

Between 1832 and 1854, James and Te Wai had eight children, with Jacob William being the sixth child, born at Queen Charlotte Sound in 1849. The first three children were baptised by the Rev. Samuel Ironside at Cloudy Bay on 13 December 1841, the same day that he formally married James and Te Wai.

Over the years between 1832 and the end of the century, James and his family lived an eventful life. In the first few years of their life together they had frequently to look out for their personal safety in the fighting that flared up periodically among Ngati Toa, Te Ati Awa, Ngati Raukawa and Ngai Tahu in the lands bordering Cook Strait. In August 1939, James served as the local pilot for the New Zealand Company ship "Tory" as it explored the Wellington Harbour area. Later in the same year, in December, James climbed Mount Egmont (Mount Taranaki) with Dr. Dieffenbach, returning to Wellington to be employed as Harbour Pilot by the New Zealand Company for the next two years. James often commuted across Cook Strait in a 14

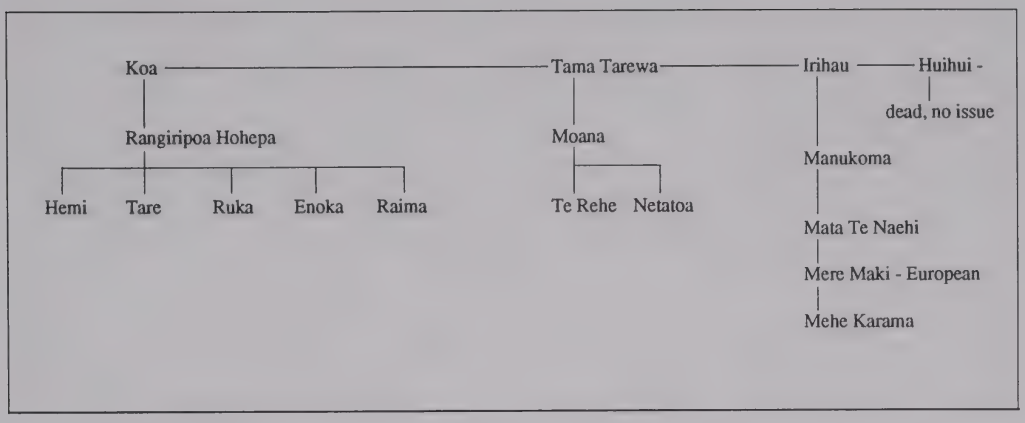


Fig. 3. Genealogy, Maori Land Court, Wellington Minute Book No. 1: 242-3.

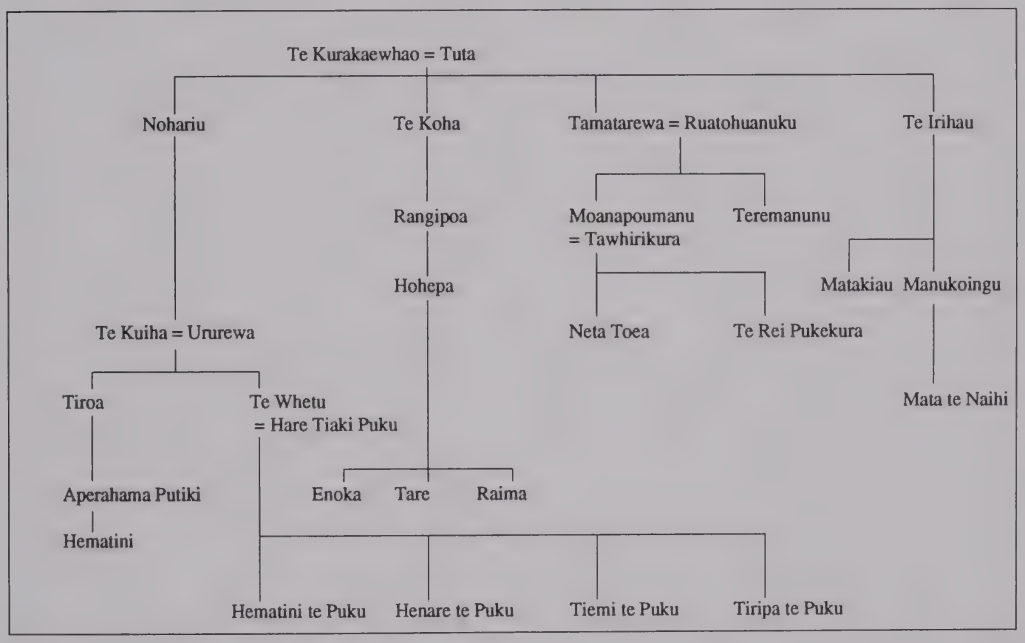


Fig. 4. Genealogy, Maori Land Court, Nelson Minute Book No. 1: 160, 209.

feet long open boat between Wellington and Queen Charlotte Sound. By the time that Jacob was born in 1849, intertribal fighting had ceased in the Cook Strait area and the new European settlement of Wellington was already nine years old.

Te Wai died on 25 June 1877, probably at Picton or elsewhere in Queen Charlotte Sound and is said to have been buried at Oyster Bay in Tory Channel. After a second marriage at the age of 70 in 1879, James died by drowning in Picton Harbour on 26 September 1899 and was buried either beside Te Wai at Oyster Bay or near the present Picton Museum (Charles Heberley, pers. comm. 1991).

THE LIFE OF JACOB HEBERLEY

One family record gives the date of Jacob's birth as 11 April 1849, but virtually nothing is known of his early life. Presumably he grew up around Queen Charlotte Sound and in Wellington, as his father moved between the two centres. The Wellington Electoral Roll for 1857 lists James Heberley of Queen Charlotte Sound as the owner of freehold land at Pipitea Pa, Wellington, probably a section in the angle formed by Pipitea Street and Thorndon Quay although the deeds to this land were later declared invalid.

Jacob next emerges into history as a young man living at Petone. His earliest known dated carving, a large ornate bowl with figure supports, is said to have been carved at Petone in 1869, that is, when Jacob was just 20 years old. Family members are now unsure as to what Jacob actually did for a living since he was almost certainly not a full-time carver. In about 1874 Jacob moved to Greytown in the Wairarapa where he was listed as a "freeholder". While living in Greytown Jacob met his future wife Sarah McLachlan who had been born in Christchurch. Three years after arriving in Greytown, Jacob married Sarah on 30 August 1877 at the home of Sarah's step-father. Their first three children were born in Greytown. Jacob must have continued to practise carving while living in Greytown because at least two walking sticks and one patu which can be firmly attributed to his hand have particular Greytown or Wairarapa provenances. Later he moved back to Wellington city where he rented his home, perhaps indicating a downturn in his financial status (Miriam Heberley pers. comm. 6 March 1990). In 1889, after the death of their father Joseph, Jacob's two young nephews, Thomas aged 13 and Herbert aged 12, came to live with their uncle and his family in Petone. Both Thomas and Herbert soon became accomplished Maori carvers under their uncle's tutelage. Jacob and Sarah eventually had eight children. Their youngest and last surviving son, Cyril Llewelyn Heberley, was born in Wellington in 1893 (*Evening Post*, 22 September 1975). Jacob was especially active as a carver producing works on commission for the Government and other prominent Wellington citizens in the years of 1901 and 1902. This carving activity in such a public arena brought Jacob moderate fame as an artist for the last few years of his life.

Jacob died in Wellington on 28 June 1906 and an obituary appeared in three newspapers. That in the *Evening Post* was the most comprehensive:

> "Deaths. Heberley — On the 28th June 1906 at his residence 24 Ohiro Road, Jacob William, dearly beloved husband of Sarah Heberley, aged 56 years.
>
> The late Mr Jacob Heberley, who died in Wellington on Thursday night was a remarkably skilled Maori carver as well as an artist of no mean order. It was Mr Heberley who carved the Maori walking stick that was presented to His Majesty the King by the late Mr. Seddon. While Lord Ranfurly was in NZ, Mr Heberley executed several commissions for him and he also carved the Maori works of art presented to the Prince and Princess of Wales on their visit to the colony in 1901. The late premier was a great admirer of Mr Heberley's work and it was on Mr Seddon's suggestion that he was entrusted with the work of carving a Maori frame in which the illuminated address from the people of NZ was presented to King Edward. Mr Heberley was 56 years of age at the time of his death. The funeral takes place tomorrow."
>
> (*Evening Post*, 30 June 1906, p. 1.5)

A shorter and slightly variant version was published in the *New Zealand Times* on Friday 29 June and in the *Hutt and Petone Chronicle* on Saturday 30 June 1906, which read:

> "Mr Jacob Heberley, the well-known Maori carver, formerly of Petone, died in Wellington on Thursday night, after a long illness. The deceased was a very clever craftsman. He carved the specimens of Maori art presented to the Princess of Wales when her Highness was in Wellington. He also did a considerable amount of similar work for Lord Ranfurly and carved a walking stick for his Majesty the King. Mr Heberley was 56 years of age."

According to the funeral notice in the *New Zealand Times*, Jacob was to be interred in Karori Cemetery on Sunday 1 July at 3 p.m.

Apart from their interesting content, these obituaries are also revealing in the attitudes towards Maori carving held by Europeans of that time. They emphasise the aspects of "skill" and "craftsmanship" which are needed to produce well-formed "specimens", concentrating on the formal qualities of the works without reference to any embodied meaning or content. "Artistic" ability is seen as a distinct attribute which Jacob also displayed, with the implication that only exceptional carvers such as Jacob possessed it. Lesser carvers may have had the skill but lacked the "artistic" ability. There seems to be a muted surprise that Maori carving should be regarded as an appropriate gift to royalty, that it needed the patronage of prominent Europeans to make this acceptable, and that it was a privilege for Jacob to be entrusted with this work. Family members say that Jacob was also known as a painter of portraits in the European style and a portrait of Worser by Jacob is held by descendants (Edward Chambers, pers. comm. 16 February 1991). Grady (1978:pl.44) reproduces this portrait of James which is a very accomplished work of art. Perhaps Jacob's role as a portrait painter may have contributed to his acceptance as an "artist" in the special sense described above.

THE ORIGINS OF JACOB'S CARVING STYLE

Jacob was born into an area with a complicated art history. Fortunately, artefact collections and ethnographic observations made by early European visitors provide some understanding of the art and material culture prevalent there during a period of about eighty years before Jacob's birth in 1849.

Maori artefacts collected in Queen Charlotte Sound in 1770, 1773-1774, and 1777 during Captain James Cook's three expeditions to New Zealand reflect the presence of a strong distinctive local culture persisting through this time, but with influences and objects intruding from other tribal areas in the northern South Island, from the Horowhenua-Wanganui-Taranaki regions of the western North Island, and from the East Coast of the North Island (Simmons 1981). Nearly fifty years later, in 1820, Captain F.G. Bellingshausen of the Russian Navy arrived in Queen Charlotte Sound. Collections and observations made by his scientists document a continuation of the local culture from the time of Cook, but with strong influences from outside Queen Charlotte Sound. Most of these influences emanated from the Wanganui-Taranaki

area and the East Coast of the North Island. Woodcarving especially shows the evidence of these two northern influences reaching into Queen Charlotte Sound in the first decades of the nineteenth century (Barratt 1979; Simmons 1981).

Very soon after the departure of Bellingshausen, major tribal movements into the Cook Strait region from the Waikato and Taranaki areas drastically altered the tribal composition and distribution of the peoples around Queen Charlotte Sound and Wellington. Driven by their powerful neighbours from the north and attracted by new lands and access to European goods, groups of Ngati Toa from Kawhia, Ngati Raukawa from the southern Waikato, and several tribal groups from northern Taranaki, all moved into the Wellington-Manawatu region in the 1820s and early 1830s, conquering and displacing the original tribes. Ngati Toa took over Kapiti and the Porirua area, Te Ati Awa occupied Wellington Harbour and both these tribes extended into Queen Charlotte Sound, with Te Ati Awa becoming predominant in the Sound. James 'Worser' Heberley arrived in Queen Charlotte Sound as these two tribes were consolidating their occupation. By the time that Jacob was born in 1849, the new tribal distribution was well established. This same new tribal pattern is essentially the one that persisted through Jacob's lifetime and into the present day.

Te Ati Awa and Ngati Toa both brought their own very distinctive art styles with them into the Queen Charlotte Sound area, completely replacing the earlier styles documented by Cook and Bellingshausen. Ngati Toa woodcarving style favoured full-frontal or full-profile, squat, square ancestor figures, separated from each other in multiple-figure compositions. Te Ati Awa were one of the major exponents of the northern Taranaki style of woodcarving, characterised by complex sinuous figures with elongated bodies and limbs often intertwined and linking with neighbouring figures in a composition.

George French Angas, the artist who travelled through the Wellington-Porirua-Queen Charlotte Sound areas in 1844 documented the co-existence of these two unrelated styles. At Mana Island, Angas painted exterior and interior views and details of the ornate house that Te Rangihaeata of Ngati Toa had built and carved for himself in magnificent Tainui Ngati Toa style. In Queen Charlotte Sound, Angas painted views of colourful burial monuments decorated with kowhaiwhai patterns, set up by Ngati Toa to honour their dead. At Kaiwharawhara in Wellington Harbour, Angas painted the house of Taringakuri, a Te Ati Awa chief, taking special care to document the Taranaki style tekoteko (Angas 1847, 1972). At Petone in the 1840s, William Fox painted the gateway of Te Puni's pa, apparently attempting to depict the curved and linked figures of Taranaki woodcarving style (Butler 1980:42). At Waikanae, William Swainson sketched huge Te Ati Awa carved stockade posts left abandoned after many of Te Ati Awa had returned to Waitara with Wiremu Kingi Te Rangitaake in 1848 (Carkeek 1966:86; Macmorran 1977:13). No doubt many other Te Ati Awa settlements in the Sounds and Wellington were equipped with important carved art-works, now sadly lost.

In all probability, some of this artistic profusion survived into the years of Jacob's childhood, providing him with models and inspiration to guide his later work. Many of the Queen Charlotte Sound Maori families also retained tribal heirlooms carved in these styles that Jacob would have seen around their homes. No information is

available as to how or from whom Jacob might have learnt his art. Circumstantial evidence regarding the demise of traditional Te Ati Awa carving in this area suggests that Jacob was probably self-taught.

Ngati Toa carvers had continued to practise their art at Porirua into the later years of the nineteenth century, periodically refreshed by training and new recruits from their Tainui relatives in the Waikato where carving still flourished.

One such Waikato-trained carver active at Porirua and Otaki in the later years of the nineteenth century was Piwiki Horohau of the Ngati Huia hapu of Ngati Raukawa. He did the carvings for Kikopiri house near Levin in 1889 and for the original Toa-Rangatira meeting house at Porirua in 1900 (Phillipps 1955:24, 43). Piwiki also began producing model houses and various other forms of small carved boxes, tobacco containers and vases, for sale and as gifts, probably at about the same period as Jacob. Jacob may have had contact with some of these carvers but his Te Ati Awa connections would probably have pre-disposed him to look to Te Ati Awa carvers for teaching and inspiration. However, among local Te Ati Awa of Wellington and the Sounds in the 1850s and 1860s, woodcarving was virtually already a lost art. Wiremu Kingi Te Rangitaake had carved a magnificent war canoe prow in Wellington some time prior to his return to Waitara in 1848 (Archey 1977:59; Carkeek 1966:86). Other Te Ati Awa carvers were probably among the large party who left the Wellington-Waikanae area for Waitara with Wiremu Kingi. When Wi Tako Ngatata built his famous storehouse named Nukutewhatewha in the Hutt Valley in 1856, he invited carving experts from outside the area to carry out the work, from Ngati Porou according to Phillipps (1952:107), but from Ngati Tuwharetoa according to McEwen (1966:425) who was told this by Ngati Tuwharetoa elders who had known the carvers personally (J.M. McEwen, pers. comm. 11 November 1990). Also judging by the carving style of the storehouse, these experts were definitely from Ngati Tuwharetoa. In 1860 when he became one of the more outspoken advocates of the Maori King Movement in the Wellington district, Wi Tako moved to Waikanae with his followers and built a large meeting house there to serve as a Kingite headquarters (Carkeek 1966:95). According to Taylor (1870:344) every part of this house "had a symbolic meaning attached to it" but the identity of the carvers is not recorded. There is no evidence of any development of a Te Ati Awa tourist art in the Wellington or Sounds area during the period of the 1860s when Jacob must have been learning his art.

With this decline and eventual demise of Te Ati Awa carving, Jacob was also denied the opportunity to have learnt his art on communal carving projects. When he was ready to learn carving in the mid-1860s, the great carved war canoes were rapidly becoming obsolete. Small plain dugout canoes were still used on Wellington Harbour and about the Sounds but the place of the large war and voyaging canoes had been taken by whaleboats and small sailing ships. Large fully carved meeting houses assumed the role previously played by war canoes as a focus of hapu and iwi pride and prestige, but few large carved houses were built in the Wellington area and none in the Sounds. Jacob never did work on any large tribal carving projects.

An examination of the figural types and motifs used by Jacob suggests that he was eclectic, combining features from various areas and styles to create his own distinctive personal style. Some of his favourite motifs, such as his abbreviated manaia, his pointed oval rauponga sections, and aspects of his kowhaiwhai patterns,

were probably as much his own invention as they were adaptations of traditional types. Nevertheless, some of his pakati notches do show a strong Taranaki style similarity, while others could be matched with Arawa types.

Without any involvement in major tribal projects, the types of objects that he developed in his repertoire were determined by impersonal market forces and by the needs of highly selective commissions for special purposes. Thus his repertoire included replicas of wahaika and kotiate designed to show off his carving virtuosity, models of traditional objects no longer extant such as storehouses, walking sticks that appealed to both Maori and Pakeha gentlemen, elaborately carved wakahuia evolved from traditional types, and various completely non-traditional objects such as carved frames (Fig. 5).

DOCUMENTED CARVINGS BY JACOB HEBERLEY

A total of 22 carvings can be documented with varying degrees of certainty as being the work of Jacob Heberley. They have been identified by study in museums, archives and private collections in New Zealand and worldwide. For some of these carvings, Jacob is actually recorded in museum registers and other written sources as the carver. Others can be identified as his work by appearing in photographs that establish their link to him. Still others can be deduced to be his work by their mention in oral histories retained among Heberley family members or associates. In a few rare cases, the general circumstances of the commission are recorded in contemporary documents. Only one object, a treasure box (Catalogue number 9) actually has Jacob's name attached to it, imprinted by a metal stamp, a sure sign of Jacob's involvement in the commercial world.

Judging by the dates of Jacob's documented carvings, he was active as a carver at least sporadically throughout his adult life, commencing with a bowl in 1869 and ending with a model storehouse, carved frame and walking stick in 1902. Throughout this long carving career, Jacob maintained a very high standard of skill and finish, with no apparent decline in quality in later life. Nor did his work become either more or less ornate as so often happened with other carvers in the course of their working life. This constancy through time makes it virtually impossible to date Jacob's carvings relatively within his career solely by their appearance.

The range of Jacob's oeuvre is impressive, encompassing figure-supported bowls, other types of bowls and containers, feeding funnels, walking sticks, various types of short clubs, long clubs such as taiaha, tewhatewha and pouwhenua, paddles, treasure boxes, model canoes, weaving pegs, combs, various pendants, model storehouses, a door lintel, an agricultural tool and a shark-toothed knife. Most of this work was carved in soft woods but Jacob was equally competent in whalebone. However, despite the apparent diversity, there are three important regularities in this total assemblage of 77 objects.

Firstly, apart from the door lintel, all are small portable self-contained items, eminently suitable for personal transport and presentation. Secondly, the diversity is actually highly selective when considered against the total range of Maori material culture. A carver working in the traditional milieu was involved in the production of

many different types of items. The most important proportion of these would have been components of complex architectural structures and canoes produced by teams of carvers working in concert. In strong contrast, all of Jacob's output consists of individual items each made for a separate purpose. The third regularity is that Jacob's carvings were all designed to fulfil a symbolic or ceremonial purpose and not a practical instrumental function. This applies even to his walking sticks which are often structurally quite weak. Therefore, Jacob's products are all either reduced-scale models, full-sized replicas, or totally non-traditional objects.

Fig. 5. Jacob Heberley with a selection of his carvings. Photo: Courtesy of Mrs Puti Hookings, Parkstone, Dorset.

These three regularities are obviously a result of the special nature of Jacob's patronage. Instead of supplying functional objects for use in an intact traditional Maori society, Jacob was apparently almost totally immersed in a European-dominated art market in which his Maori family and Maori associates were very minor participants. Most important among his patrons were the prominent European collectors of Maori curios, individual politicians, and government departments commissioning gifts for distinguished visitors. Naturally, these are also the sort of patrons who would be most likely to leave records of their association with Jacob, as opposed to any Maori associates or anonymous tourists. Nevertheless, the evidence of Jacob's surviving works also supports this concentration on a local European market.

1. Figure-supported bowl, kumete. Figures 6, 7.

Repository: National Museum, Wellington. ME. 7903.

Provenance: Alexander Turnbull Collection.

History: "Carved by J. Heberley at Petone 1869" according to National Museum register.

Size: 51 cm long, 35 cm wide, 46 cm high.

Description: According to the National Museum register entry for ME. 7903, this bowl was "carved by J. Heberley at Petone 1869". However, this same bowl had been registered twice earlier as ME. 4632 and ME. 2468, as "carved bowl by Heberley". It is only the later registration under ME. 7903 that introduces the information that the bowl was carved at Petone in 1869. Perhaps by the time this later registration was made in about 1956, some further information had become available, although no other documentation has been located. The bowl was presented to the museum on 14 December 1911 as part of the extensive Alexander Turnbull Collection of Maori and Pacific artefacts. Augustus Hamilton, the Director of the museum, had seen and photographed this bowl prior to 1911 while it was still in Turnbull's private collection. Hamilton mounted the photograph in his New Zealand Institute "Record Collection of Photographs of the Ethnology of the Maori Race" (Number 937), describing it as "a modern Maori carving" with no reference to Heberley. It was figured by Rowe (1928:Fig. 18) as an outstanding example of "Maori artistry". If the date is correct, this is by far the earliest piece of carving known from the hand of Jacob Heberley, who in fact would only have been aged twenty in 1869. It is an extremely accomplished work for such a young carver and therefore may actually belong to a later date.

Measuring 46 cm high with the lid on, the bowl features a male tattooed figure with naturalistic face at each end, supporting a deep container decorated with whakarare surface patterns and a koruru type of stylised face on the sides. The detachable lid has the same whakarare surface patterns surrounding two raised relief frogs touching mouth-to-mouth. This work displays many of the stylistic characteristics that

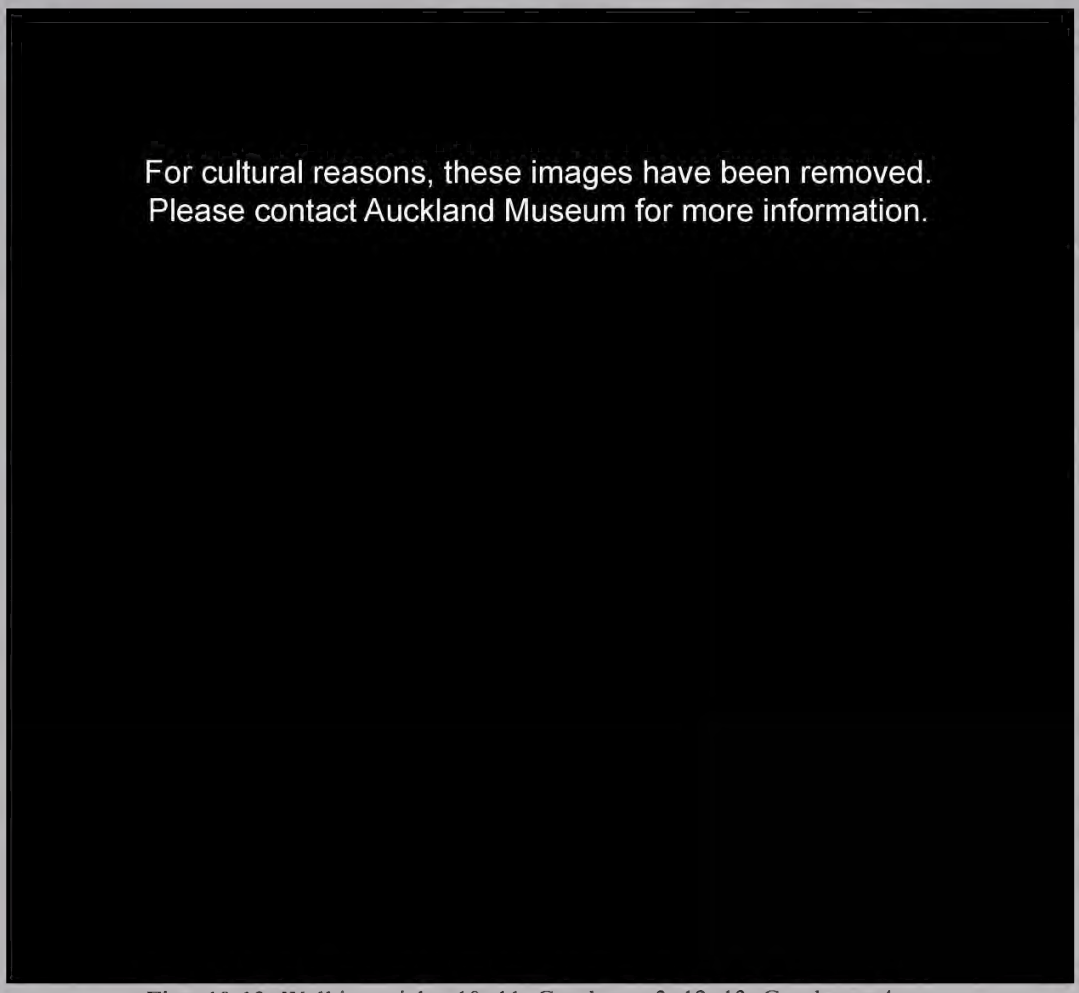
Figs. 6-9. Figure-supported bowls. 6, 7. Catalogue 1. 8, 9. Catalogue 2. Photos: National Museum.

make Jacob's style so distinctive. Of particular note are the naturalistic faces, the deep triangular space left between curving rauponga (as seen on the figures' elbows), a deft sureness of line, delicate and neat inlay shellwork, and an overall neatness of execution leading to a rather static and motionless expression. Jacob carved other bowls like this one and he also used many of these motifs in his other compositions.

2. Figure-supported bowl, kumete. Figures 8, 9.
   Repository: Unknown.
   Provenance: Known only from photographs.
   History: Said to have been carved for Lord Ranfurly.
   Size: Not available.
   Description: This bowl is known only from three photographs. Two of these photographs show it as a finished object, one in end and one in side view. These two photographs were mounted among a photographic collage of Jacob's work, along with a portrait of Jacob, surrounding the text of his obituary (Copy photograph, Auckland Museum Negative number C. 3943). An earlier photograph (Fig. 5) shows Jacob standing beside some of his work, including this bowl in an unfinished state. At the time of this photograph, the shape of the bowl had been formed and some of the surface decoration was just being outlined into the side of the bowl. Judging by the age of Jacob in this photograph, the bowl was probably completed in the later years of his life. Heberley family records note that the bowl was carved for Lord Ranfurly but it cannot be identified in the catalogue of the Ranfurly collection (Montgomery 1922).

   The photographs of the finished bowl show an object very similar to Catalogue number 1, but perhaps slightly smaller and certainly more elaborate. Bowl 2 has additional surface decoration, an extra notched embellishment around the eyes of the koruru on the side of the bowl, and an extra band of low-relief kowhaiwhai around the upper rim of the bowl. This type of kowhaiwhai patterned relief was another favourite motif of Jacob's, occurring frequently in his other works.

3. Walking stick, tokotoko. Figures 10, 11.
   Repository: National Museum, Wellington. ME. 12066.
   Provenance: Collection of Mrs Pain, Martinborough, Wairarapa.
   History: Carved by Jacob Heberley in 1872.
   Size: 90.5cm long.
   Description: In a manuscript list of the Pain Collection, this tokotoko is described as "stick carved by J. Heberley in 1872". Possibly carved by Jacob in the Wairarapa although apparently dated two years before he went to live there, this tokotoko is a very



Figs. 10-13. Walking sticks. 10, 11. Catalogue 3. 12, 13. Catalogue 4.

accomplished piece of carving. It sets the pattern followed, with some variation, by all of Jacob's walking sticks produced throughout his carving career. Then, this same pattern was maintained with remarkable consistency by all those later carvers who were taught or influenced by Jacob.

As usual, the upper figure here is male, with a stylised body and naturalistic head bearing male tattoo. The head is extended into a looped handle carved with Jacob's characteristic kowhaiwhai and manaia. Again, as usual, the lower figure is female but Jacob often introduced wider variation into the degree of naturalism or stylisation of this woman. In this case, both her head and body are strongly stylised which contrasts with the extreme naturalism of some of his other female tokotoko figures. Below these two figures, a standard manaia head with bulbous mouth surmounts a zone of incised kowhaiwhai on the straight shaft.

4. Walking stick, tokotoko. Figures 12, 13.
   Repository: Hastings Cultural Centre, 717.
   Provenance: George Ebbett Collection
   History: Carved by Jacob in about 1896.
   Size: 90.5 cm long.
   Description: Collection registers and an old label state that this walking stick was carved by Jacob in about 1896. It displays most of the features associated with Jacob's characteristic tokotoko design. The head of the upper naturalistic male figure is extended into a loop handle. As usual with Jacob, the face of the male figure bears a very detailed tattoo and the eyes are represented by neatly shaped shell inserts. Below the male figure is a female with a chin tattoo and straight hair, cupping her exposed breasts with her long fingers. Below this woman, a stylised face surmounts the shaft decorated with rolling spirals. The handle loop has lightly incised kowhaiwhai patterns.

5. Walking stick, tokotoko
   Repository: Royal Collection, England.
   Provenance: Presented to King Edward VII by Richard John Seddon, 1902.
   History: Commissioned by Seddon from Jacob.
   Size: Not available.
   Description: Mentioned in Jacob's obituaries, this is the walking stick commissioned by Richard John Seddon for him to present to King Edward VII at his coronation in London on 9 August 1902. Without having seen this walking stick, it can only be assumed that it conformed to the usual composition of sticks carved by Jacob, as do all his other known examples.

6. Walking stick, tokotoko.
   Repository: Private collection, Marlborough Sounds.
   Provenance: Still held by descendants.
   History: Carved by Jacob for his father (E. Chambers, pers. comm, 16 February 1991).
   Size: Not available.
   Description: According to family tradition, this is the walking sick that James Heberley was holding when he died.

7. Whalebone club, wahaika. Figure 14.
   Repository: Museum of Cultural History, University of California, Los Angeles. X65-1417.
   Provenance: Sir Henry Wellcome Collection.
   History: Carved by Jacob and previously owned by Tamahau Mahupuku of Greytown, Wairarapa.
   Size: 38.3 cm long.
   Description: Lord Ranfurly obtained this club during his term as Governor-General of New Zealand. When the Ranfurly collection was sold by public auction in Ireland in 1922, the catalogue entry for this wahaika read as follows: "Whalebone mere, modern,

Fig. 14. Whalebone club. Catalogue 7.

made by Heberley of Petone. Belonged to the chief Tamahau Mahupuku of Greytown, NZ. Given by his widow in 1904" (Montgomery 1922:Lot 823). From this auction, the club passed into the hands of Sir Henry Wellcome and eventually to the Museum of Cultural History at the University of California, Los Angeles (Carter 1965:11, 17).

Tamahau Mahupuku was a prominent chief and politician at the Maori settlement of Papawai, a few miles to the east of Greytown where Jacob lived for several years around the time of his marriage and afterwards. No doubt Jacob had some contact with Tamahau Mahupuku. This is one of the few instances where a carving firmly documented to Jacob can then be documented to have passed into Maori hands.

The abbreviated manaia figure protruding from the blade is an innovation by Jacob, much larger than the usual figure on a traditional functional wahaika, and very vulnerable to damage. Obviously, this club is a purely ceremonial object, never intended for use in combat.

8. Bone pendant. Figure 15.

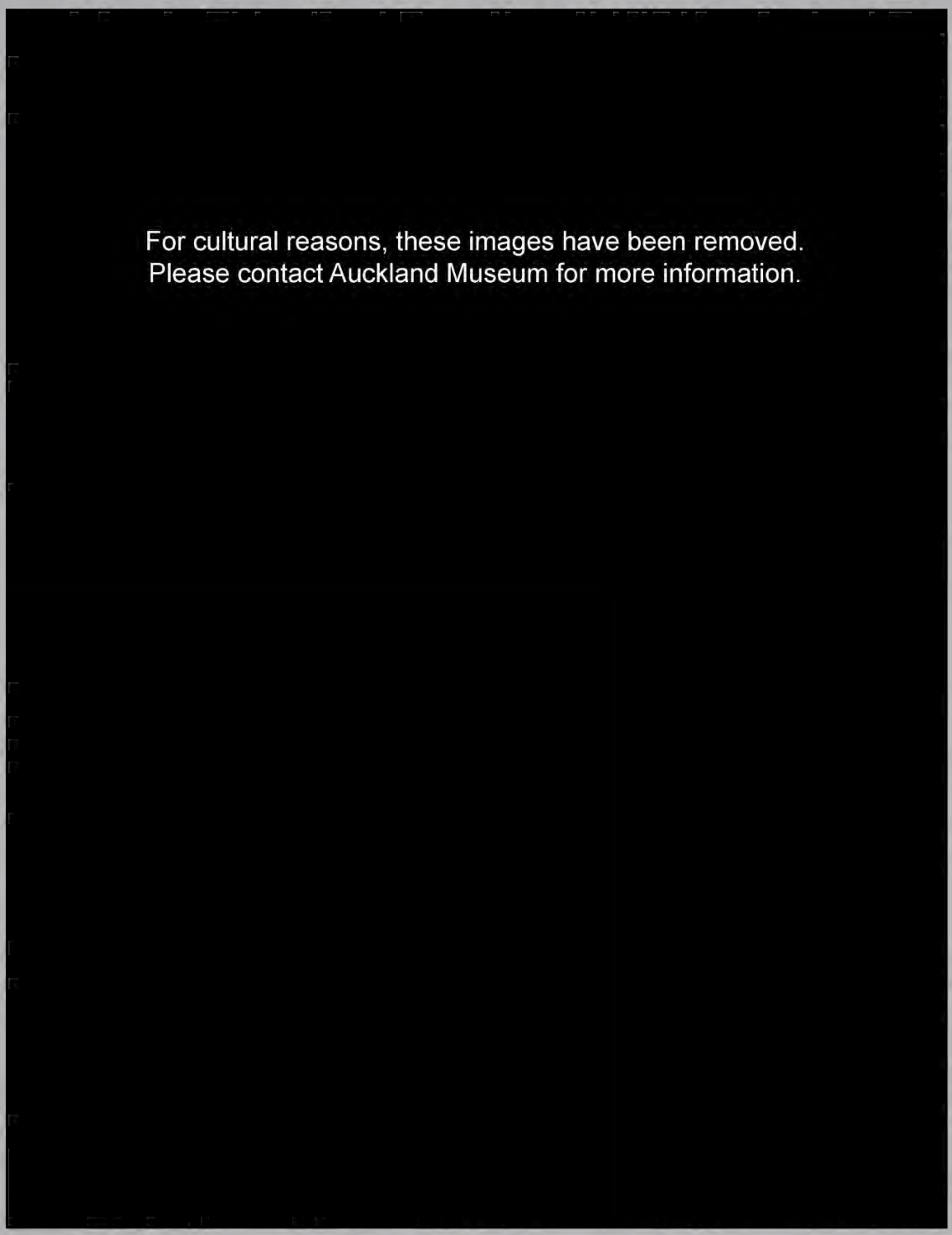
Repository: Private collection, Pauanui.
Provenance: Held by grandson of Mary Ann Tattle.
History: Made by Jacob and given to his landlady in Petone.
Size: 7.4 cm long, 2.4 cm wide.
Description: According to her grandson, Mary Ann Tattle owned property in the Wellington area and Jacob Heberley was a tenant in one of her houses in Petone (Bernard Tattle, pers. comm. 8 December 1990). Jacob gave this pendant to his landlady and it has been held by the Tattle family ever since. A Tattle family tradition also states that "Jacob taught Lady Ranfurly to carve in Maori style".

Fig. 15. Bone pendant. Catalogue 8.

This small bone pendant, probably whalebone, reproduces in miniature all of the characteristic features seen in full-size patu carved by Jacob. The same manaia with foot-in-mouth is most prominent. Despite the small size, Jacob's personal carving style is clearly apparent. Ear pendants in the form of a miniature patu like this were popular for a period around the turn of the century.

9. Treasure box, wakahuia. Figure 16.
Repository: General Assembly Library, Wellington.
Provenance: Richard John Seddon memorabilia.
History: Carved by Jacob, probably commissioned by Seddon.
Size: 49.5 cm long, 14.3 cm wide, 16 cm high.
Description: The underside of the lid is marked HETA TE KANI in ink, while on the inside at the bottom of the box is stamped: J.W. Heberley, Maori Carver, Wellington. Nothing is known of the occasion for which this box was made, whether it was a gift to Seddon or whether it was intended to be presented to Heta Te Kani. The metal stamp showing Jacob's name and trade is an interesting indication of his involvement with the commercial world.

The box itself is a very standard product of Jacob's art, adapted from the form of a traditional wakahuia but given a flat uncarved base on which to rest and displaying enlarged stylised heads protruding on non-traditional and rather ungainly straight cylindrical necks. Jacob's characteristic low relief whakarare and kowhaiwhai patterns fill two bands around the body of the box. The eyes of all the faces are embellished with neat circular paua shell inlays and another of Jacob's trademarks are the bulbous tongues protruding from wide open mouths lined with a seried row of small homogenous teeth.



Figs. 16-19. Treasure boxes. 16. Catalogue 9. 17. Catalogue 10. Photo: *New Zealand Graphic*. 18. Catalogue 11. Photo: National Museum. 19. Catalogue 12. Photo: Courtesy of Mr Carde, Whangaparaoa.

10. Treasure box, wakahuia. Figure 17.
Repository: Royal Collection, Commonwealth Institute, London.
Provenance: Presented to the Duke of Cornwall and York at Wellington in 1901.
History: Carved by Jacob at Petone in 1901.
Size: Not available.
Description: Figured prominently in *The New Zealand Graphic* (Vol. XXVII, No.II, Saturday 13 July, 1901, p. 70), this box was commissioned from Jacob by the New Zealand Government to serve as the casket for the ceremonial trowel presented to the Duke of Cornwall and York at the laying of the foundation stone for the New Zealand Railway departmental offices in Wellington on 21 June 1901. As the *New Zealand Graphic* writer said: "The casket is the work of Mr Heberley of Petone, and is a very beautiful specimen of Maori carved work". Sir Joseph Ward as Minister of Railways presented the trowel in this casket to the Duke as part of the stone-laying ceremony (Loughnan 1902:210). According to the catalogue of Royal gifts exhibited after the tour (Imperial Institute 1902: Item 287), this casket was copied from the old feather box known as Te Matumotu o Te Okoro (no further information was supplied).

In form, box 10 is very similar to box 9, apart from slight variation in the configuration of the whakarare decoration on the box sides and the necks of the protruding heads. The stylised raised relief face on each side of the box occurs again and again in Jacob's art, always distinguished by the pointed oval sections of rauponga with a deep triangular space in the angle of their joining.

11. Treasure box, wakahuia. Figure 18.
Repository: Unknown.
Provenance: In photo-collage of Jacob's work.
History: Carved by Jacob.
Size: Not available.
Description: Mounted at the top centre of the collage of Jacob's work (Auckland Museum Negative No. C.3943), this box follows the same design as items 9 and 10 except that in box 11 the band of kowhaiwhai runs around the upper portion of the box sides with the whakarare below.

12. Treasure box, wakahuia. Figure 19.
Repository: Unknown.
Provenance: In photo-collage of Jacob's work.
History: Carved by Jacob.
Size: Not available.
Description: This box is known only from the photographic collage of Jacob's work but is so different from wakahuia 9, 10 and 11

that it needs to be noted, however inadequately. Unlike them, this box has the terminal heads set flat against the ends of the vessel, while the lid supports an inclined free-standing head at each end. Two bands of low relief kowhaiwhai cover the sides with a high relief face at mid-side.

13. Model canoe, waka. Figure 20.
Repository: Unknown.
Provenance: In photo-collage of Jacob's work.
History: Carved by Jacob.
Size: Not available.
Description: Figured in the photographic collage of Jacob's work mentioned previously, this is the only known canoe model produced by Jacob. Unfortunately, the photograph is not very clear but it does provide an important record of another type of object in the corpus of Jacob's work. Heberley family records state that this canoe was carved for Lord Ranfurly. There are at least two model Maori canoes in the Ranfurly catalogue (Montgomery 1922), but they are not identified further.

Fig. 20. Model canoe. Catalogue 13. Photo: National Museum.

14. Door lintel, pare. Figure 21.
Repository: Stout family home, Wairarapa.
Provenance: Family of Sir Robert and Lady Stout.
History: Carved by Jacob for Lady Stout.
Size: 162 cm long, 43 cm high.
Description: This pare was probably commissioned from Jacob Heberley at about the time of the royal visit to New Zealand in 1901 by the wife of Sir Robert Stout. Lady Stout knew Jacob well and as a woodcarver herself she was appreciative of his skill (Mr Robert Stout, pers. comm. November 1979). One oral tradition even claims that Jacob taught Lady Stout to carve in Maori style (B. Tattle, pers. comm. 8 December 1990).

Fig. 21. Door lintel. Catalogue 14.

This lintel is the largest known carving by Jacob and his closest approach to an architectural piece. It was carved out of two planks glued together to provide the required depth. Three frontal stylised unsexed figures with upraised hands are spaced across the lintel, separated by two large plain takarangi spirals and bordered by a sinuous manaia figure at each end, all in the approved standard configuration expected for a meeting house pare. The surface decoration consists of rauponga and limited whakarare with neat paua shell rings on wooden pegs for all the eyes. It is probably a fair comment that Jacob's finely-detailed meticulous chisel carving technique has not translated well into a large architectural composition. In the larger format, the irregularities of his cramped miniature style become more prominent and distracting, while the total composition is rather static and lifeless. On the upper portions of the door frames, Jacob has added awkward scrolls of low relief rauponga which are totally non-traditional and only serve to emphasise the purely decorative function of this work.

Nevertheless, despite these criticisms, this is a major production which must represent a significant achievement for a self-trained carver.

15. Model storehouse, pataka.
Repository: Private collection.
Provenance: Family of Sir Robert and Lady Stout.
History: Carved by Jacob for Lady Stout.
Size: Not available.
Description: This storehouse model was carved by Jacob for Lady Stout probably at about the same period that his other model pataka were being made. This one may have been the prototype for the series of pataka models described below.

16. Model storehouse, pataka. Figures 22-24.
Repository: Museum of Mankind, British Museum, London. 1901 L.I.
Provenance: Presented to Duchess of Cornwall and York at Wellington, 1901.
History: Carved by Jacob in 1901.
Size: 92.5 cm long, 79.5 cm wide, 88 cm high.
Description: Included in the photo-collage of Jacob's work (Auckland Museum Negative No.C.3943), this model pataka is now identified by the official inscription attached to its base which reads: "Presented by the women of the city and suburbs of Wellington, New Zealand to HRH the Duchess of Cornwall and York on the occasion of the visit of HRH, Wellington". The presentation of the pataka was described in the official publication of the royal tour:

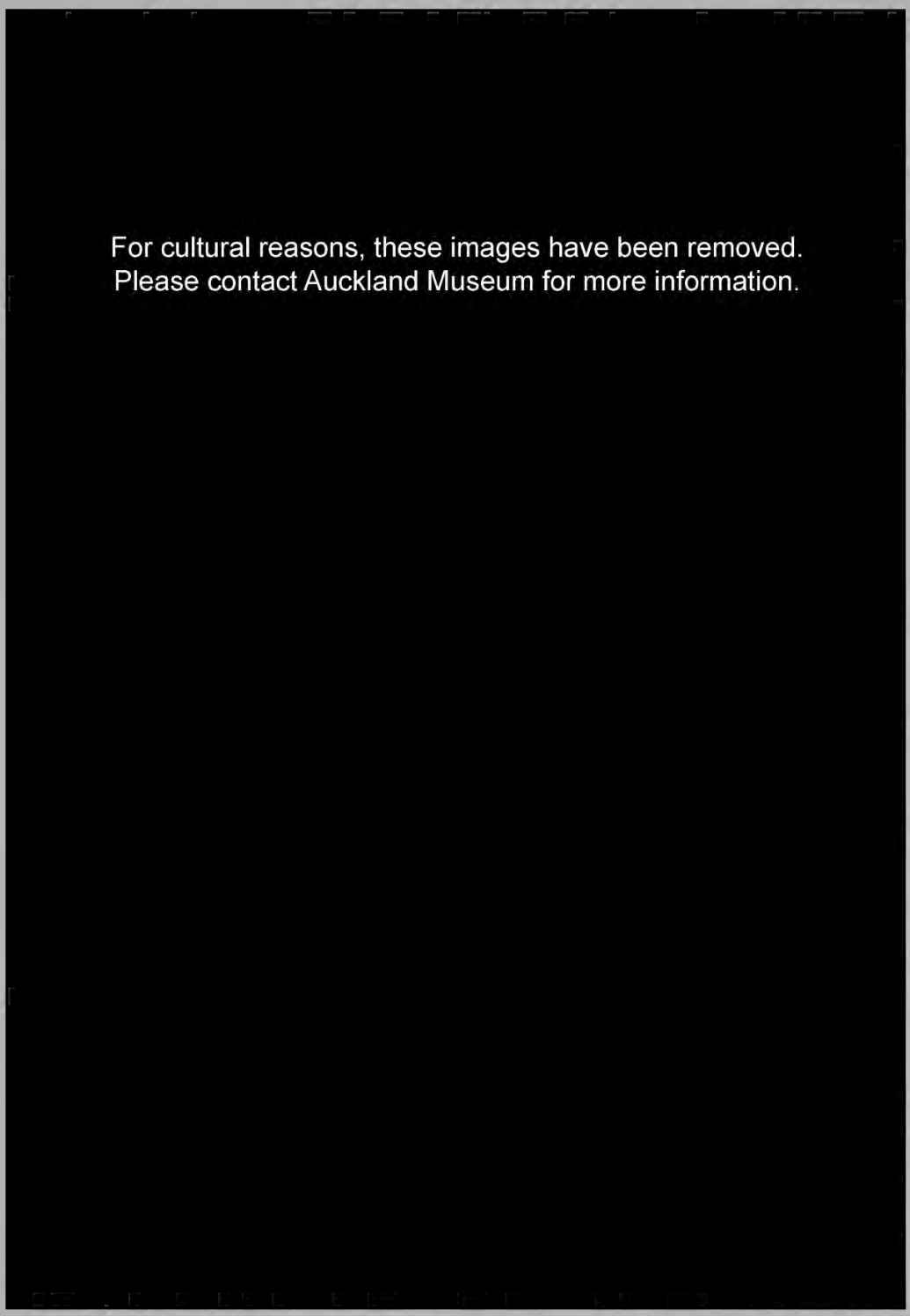
> "A little later in the forenoon a deputation of the women of Wellington waited upon the Duchess. Its members, Lady Stout, Mrs Wallis (wife of the Bishop of Wellington), Mrs H.D. Bell, President of the Women's Committee, and Mrs T.M. Wilford, were presented by the Countess of Ranfurly in the ball-room of Government house, the Duchess standing by the model of the Maori house. Mrs Bell made the presentation, asking Her Royal Highness's acceptance, as the gift of the women of Wellington, of this model of a food-house used by the Maoris in ancient times. She explained that, as the work was unfinished, the Countess of Ranfurly had kindly allowed the deputation to use her model, which was exactly like theirs, for the presentation, and she promised that when complete the gift of the women would be forwarded to Her Royal Highness.
>
> "I thank you very much," the Duchess said, adding "it was very nice and kind of the ladies to have thought of this"; then she looked with great interest on the model, examined its fine carving closely, asked, "Will it be like this?" and on being told that it would, expressed her pleasure in the most cordial terms. Having once more thanked the ladies, and asked Mrs Bell to express her warmest thanks to the subscribers, Her Royal Highness shook hands with her and the other ladies, who thereupon curtseyed and retired."
>
> (Loughnan 1902:183-5)

This account is quoted in full for the light that it throws on the totally different ethos in which the model fulfilled its purpose, so removed from the world in which it had been created. As was usual in this alien context, the official chronicler of the tour did not even think it necessary to mention the name of the artist who had created this object at the centre of their short attention. In fact, Lady Stout had been instrumental in arranging for the commissioning of this model from Jacob Heberley (Robert Stout, pers. comm. November 1979). In the photo-collage of Jacob's works this model is shown standing on a somewhat flimsy carved table, also clearly the work of Jacob judging by its style of carving. This table has now become separated from the model and its present location is unknown.

A very full description of this model including the carver's name was provided in the catalogue of Royal gifts exhibited back at the Imperial Institute, London in May 1902:

> "439. A Model, in hardwood, of a Maori gabled house, elaborately carved with grotesque masks and the usual native ornaments in panels bound together by cane, the eyes of the masks encrusted with Venus-ear shell; at one end of the house is a small gallery on to which opens the sliding door; at the top of the gable is a grotesque, formed as a figure of a man with the "Moko" tattooing, standing on a monster head; the whole house rests upon nine supports. The model stands upon a table with a revolving top, carved in low relief with scrolls, zigzags, etc. The model, together with the table, is the work of J.W. Heberley, of Petone.
>
> From the Women of the City and Suburbs of Wellington, New Zealand."
>
> (Imperial Institute 1902:71)

The pataka stands on a slightly larger flat wooden carved base. The koruru and tekoteko at the roof apex is 30 cm high, and as an extra touch, Jacob has given the koruru a crown on its forehead. The roof and the rear of the storehouse are covered with fluted board, while the panels on the sides are all carved with Jacob's favourite low relief kowhaiwhai pattern. All of the front porch is minutely carved with the usual attention to detail, featuring full-frontal figures all over the porch wall and openwork takarangi spirals and manaia on the maihi and paepae. In designing his pataka, Jacob apparently had a clear idea of the overall form of a pataka but his carvings on the maihi and paepae do not reproduce the motifs of pakake (whale or seamonster) and ancestor figures usually appropriate to this construction. Instead, Jacob has filled in both maihi and paepae with sections of the same pattern, purely for decorative effect. Furthermore, the off-centre door is not accurate for a traditional pataka, but would have been appropriate for a dwelling house.



Figs. 22-25. Model storehouses. 22-24. Catalogue 16. 25. Catalogue 17. Photo: National Museum.

17. Model storehouse, pataka. Figure 25.
Repository: Unknown.
Provenance: Previously owned by the Countess of Ranfurly.
History: Carved by Jacob at Petone in 1900-1901.
Size: Not available.
Description: This is the model pataka referred to by Loughnan (1902:183) as belonging to the Countess of Ranfurly, wife of the Governor of New Zealand, Lord Ranfurly. It was shown to the Duchess of Cornwall and York as a substitute for catalogue number 16 which was still unfinished. The Ranfurly pataka is illustrated in a scrapbook belonging to Augustus Hamilton, now in the National Museum, Wellington, but the caption to this photograph has confused it with the pataka presented to the Duchess. The Ranfurly pataka is very similar in overall form and off-centre door but has significant differences in the carved details, including figures instead of plain piles at the front, and figures for amo instead of the openwork pattern used on the Duchess's pataka. The Ranfurly pataka also lacks the kowhaiwhai sides.

When the Ranfurly family collection was sold at public auction in 1922, this pataka model was described in the catalogue as follows:

> "Lot 912 Model of Maori House (Pataka), made entirely of kauri wood and dressed flax, on table; house raised on posts and used for storing food; took ten months to make. The Tiki on the gable represents Turi, Head Chief of the Aotea Canoe which arrived in North Island five centuries ago. The other figures represent his descendants to Te Rauparaha who died at Otaki 1849.
>
> A copy of this model was presented by the New Zealand Government in 1901 to the present King and Queen."
>
> (Montgomery 1922:48)

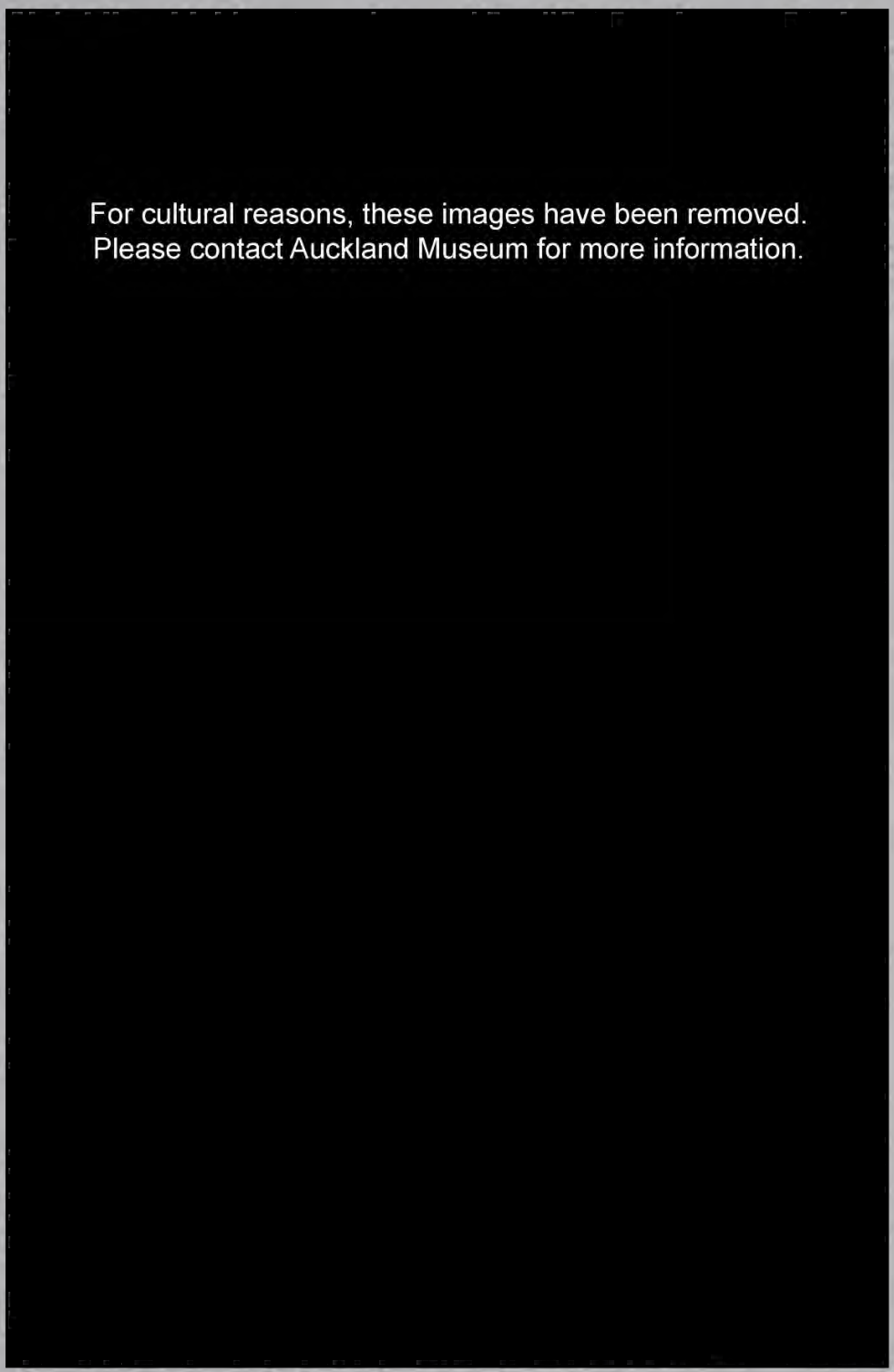
According to this description, the Ranfurly pataka is one of those very rare examples of Jacob's work in which the figures have been given ancestral identifications.

18. Model storehouse, pataka. Figures 26, 27.
Repository: Royal Collection, Commonwealth Institute, London.
Provenance: Presented to King Edward VII on his coronation 1902, by Richard John Seddon.
History: Carved by Jacob at Petone in 1902.
Size: Not available.
Description: This is the model pataka commissioned by the New Zealand Government to serve as the casket for the Coronation Address presented by Seddon to King Edward VII on 23 April 1902 (Loughnan 1902: opp. page 333). A view of the front of this

pataka is included at top right in the photo-collage of Jacob's work. Loughnan's oblique view of this pataka clearly shows how Jacob used the same basic form as in pataka 16 and 17, but with major differences in the carving which make pataka 18 the most elaborate and in some respects, the most accurate of the three. In pataka 18 the doorway is now properly in the centre of the porch and features a very accurate miniature rendition of a pare and high relief whakawae. Better looking manaia are attached to the rear of the pataka as well as the front. Well-shaped deeper relief kowhaiwhai patterns decorate the sides. The frontal fascia carvings are still not accurate in terms of traditional pataka motifs but the repeating decorative patterns are beautifully executed in best Jacob Heberley style featuring a unique innovation of partial takarangi spiral arcs between frontal and manaia faces. The amo now display two takarangi spirals each. These diverse designs are blended beautifully into a delicate harmonious composition, one of Jacob's most successful efforts.

All of the above four model storehouses (15, 16, 17, 18) were carved within a very short period between 1900 and 1902. In basic form and decoration they share many features. One striking aspect of the carving design is the way Jacob has chosen a very different pattern for the front of each pataka, which is then repeated on both maihi and paepae. Such a repetition of the same design on both the maihi and paepae of a pataka is not seen on traditional pataka. Instead they usually have the pakake or whale motif on the maihi or blank maihi, and alternating ancestor and manaia figures across the paepae. Jacob was no doubt familiar with Wi Tako's famous pataka Nukutewhatewha which still stood in the Hutt Valley while he was a young man there, later being re-erected in a private garden in Wellington. Like other pataka carved by Ngati Tuwharetoa, Nukutewhatewha had plain maihi without the pakake motif. The absence of pakake on Jacob's models and the design on the paepae of model pataka 16 suggest that Jacob was influenced or inspired by Nukutewhatewha when planning his model pataka. Jacob's paepae patterns, especially on pataka 16 and 18 are also reminiscent of the paepae on another famous Ngati Tuwharetoa pataka, named Hinana at Waihi on Lake Taupo (Phillipps 1952:121).

It is known that the Ranfurly pataka (17) was completed first, sometime before June 1901. Then the pataka for the Duchess of Cornwall and York (16) was completed soon after. Sometime later but before April 1902, the pataka for King Edward (18) was finished. Viewing these models in the sequence of their production (17, 16, 18), a definite improvement in technique and refinement can be detected.



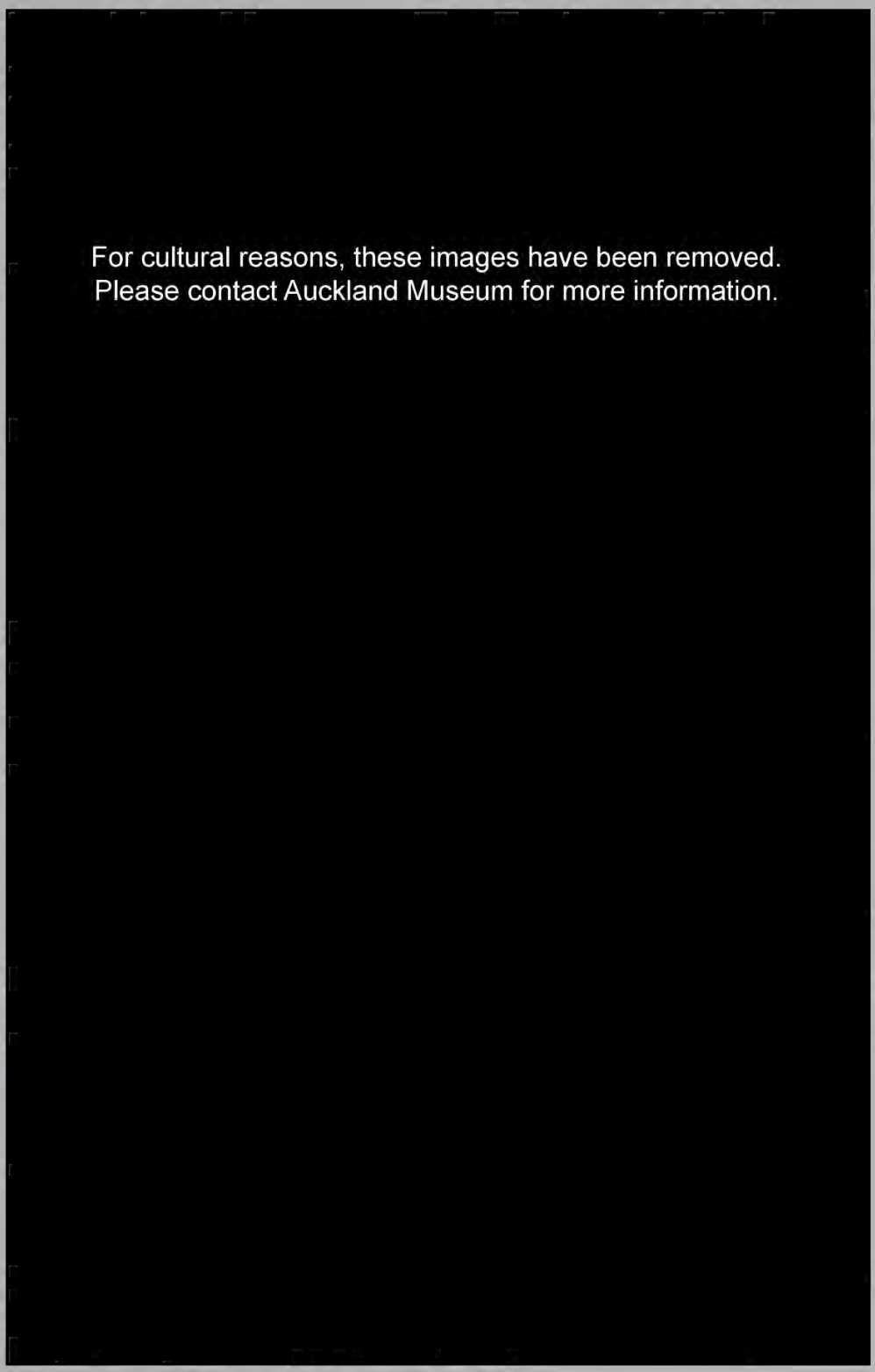
Figs. 26, 27. Model storehouse. Catalogue 18. Photos: National Museum; After Loughnan (1902).

This improvement may also be significant in that pataka 17 was made for a Governor-General, 16 for a Duchess and 18 for a King, perhaps reflecting the effects of more generous patronage and an awareness of differing status among his clients. Unfortunately, attempts to trace the terms of these commissions in government archives have proved unsuccessful.

19. Frame for Coronation Address. Figure 28.
Repository: Royal Collection, Commonwealth Institute, London.
Provenance: Presented to King Edward VII on his coronation 1902, by Richard John Seddon.
History: Carved by Jacob in 1902.
Size: Not available.
Description: Commissioned by the New Zealand Government to frame the Coronation Address presented by Richard John Seddon to King Edward VII, dated 23 April 1902 (Loughnan 1902: opp. page 332). According to Jacob's obituary in the *Evening Post*, it was Seddon himself who was such a great admirer of Jacob's work that he suggested Jacob should be "entrusted" with this commission.

The photograph of this frame in Loughnan's official account shows a relatively restrained piece of carving, restricted to two registers of lightly incised kowhaiwhai and rolling spirals, separated by a single line of whakarare. At each corner is a manaia figure with minimal body, exactly as used by Jacob on many of his wahaika. At mid-point along each side is a koruru mask of the same sort used on the sides of Jacob's bowls and treasure boxes. Carefully notched paua shell eye inlays are typical of Jacob's attention to detail.

20. Frame for illuminated address. Figure 29.
Repository: Unknown.
Provenance: Presented to Duke and Duchess of Cornwall and York, 1901.
History: Carved by Jacob in 1901.
Size: Not available.
Description: This was the carved frame for the address presented by Richard John Seddon to the Duke and Duchess of Cornwall and York on their arrival in New Zealand in June 1901. In the official account of the visit, Loughnan (1902:18) described it as "a handsome frame of rare wood, carved, like everything else was, in the correct complicated Maori fashion". Jacob is not actually documented as the carver of this frame but in the context of all the other work that he did for this royal visit and the very close match of this frame to the one that Jacob is known to have carved for the Coronation Address (Catalogue number 19), there can be no doubt that Jacob also produced this frame. The photograph reproduced in Loughnan (1902:19)



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29

Figs. 28, 29. Carved frames. 28. Catalogue 19. 29. Catalogue 20. Photos: After Loughnan (1902).

Figs. 30-32. 30, 31. Garden tool. Catalogue 21. 32. Shark-toothed knife. Catalogue 22.

shows Jacob's characteristic manaia at each corner, a ruru type mask mid-way along each side, and three bands of rauponga, rolling spirals and Jacob's idiosyncratic incised kowhaiwhai.

21. Agricultural tool, timo. Figures 30, 31.
Repository: National Museum, Wellington. ME 12173.
Provenance: No data.
History: In photograph with Jacob and his work (Fig. 5).
Size: 46 cm long handle, 40 cm long point.
Description: Although Jacob has followed the basic shape of a functional timo, he has added a considerable amount of superfluous decoration to the handle. At the butt is a naturalistic tattooed male head while the handle has a stylised figure and incised kowhaiwhai.

22. Shark-tooth knife, maripi. Figure 32.
Repository: National Museum, Wellington. ME 2005.
Provenance: Alexander Turnbull Collection.
History: In photograph with Jacob and his work (Fig. 5).
Size: 39.6 cm long, 12 cm wide.
Description: Fitted with real teeth and beautifully shaped, this maripi was nevertheless clearly intended to be a replica only. Artefacts such as the timo and the maripi had long been obsolete within the culture when Jacob made these replicas. In fact, it seems fairly certain that Jacob had copied this maripi from a photograph of an early authentic maripi in the British Museum (Oc 1854, 1229.9) acquired from Sir George Grey in 1854 (Archey 1977:Fig. 180). The form is virtually identical except that instead of the northern style unaunahi surface decoration on the Grey maripi, Jacob has substituted his usual incised kowhaiwhai, whakarare and an innovative plain rolling spiral.

CARVINGS ATTRIBUTED TO JACOB HEBERLEY

On the basis of those carvings known to have been executed by Jacob Heberley, it is possible to attribute many others to his hand. Those listed below have been noted in private collections in New Zealand and in museum collections in New Zealand and overseas. In the absence of any definite documentation, these attributions have been made on style alone, although in some cases there is circumstantial information that supports the attributions. No doubt there are many other carvings not listed here that could be attributed to Jacob but this list includes all such carvings seen during twenty years of museum research in New Zealand, Australia, Hawaii, United States of America, England, Germany and Italy.

Careful responsible attribution of carvings on the basis of detailed comparison can also help to clarify the questionable origin of some items. This is the case with the Cadman Collection in Auckland Museum consisting of two whalebone patu, one whalebone comb, three walking sticks, a tewhatewha, taiaha, paddle and model canoe (AIM 38783-38790). When these items were bequeathed to the museum in 1970 by Mrs E.A.C. Cadman, they were said to have been gifts from the Arawa tribe to Mr Jerome Cadman in about 1900. Sir Alfred Jerome Cadman (1847-1905) was Minister of Native Affairs from 1891 until 1893, and later Minister of Mines and Railways, before moving to the Legislative Council in 1899. In these capacities, Cadman was probably presented with many gifts by both Maori and Pakeha groups. On close examination, virtually all of the items, except the model canoe, in the Cadman Collection can be attributed to Jacob Heberley. Therefore, while he may have received them in Rotorua perhaps either via Herbert Heberley or via some Te Arawa people who had Wellington connections, it is much more likely that these particular items were actually obtained by Cadman in Wellington, either directly from Jacob or by presentation from some body that had commissioned them from Jacob.

23. Whalebone, wahaika. Figure 33.
Repository: Private collection, Wairarapa.
Provenance: Purchased at Dunbar Sloane auction, Wellington.
History: Unknown.

Size: 36 cm long, 12.6 cm wide.
Description: The manaia figure on this club corresponds very closely to the manaia used by Jacob on the carved frames (Catalogue numbers 19, 20).

24. Whalebone club, wahaika. Figure 34.
Repository: Auckland Museum. 38785.
Provenance: Cadman Collection.
History; Unknown.
Size: 42 cm long, 12.5 cm wide.
Description: Like all of Jacob's wahaika, this club features the usual figure clasping his inward turned feet and also has an area of kowhaiwhai on the lower blade. But there are extra unusual features of a wheku face below the figure and the name "Roriki" inscribed in old-fashioned printing. The figure on the butt is different from all of those above, having the form of a manaia face with an arm holding a leg with downturned foot. This butt figure is surprisingly similar to the butt figure used by Patoromu Tamatea of Rotorua on his clubs.

25. Wooden club, wahaika. Figure 35.
Repository: Auckland Museum 6894.
Provenance: E. Brown Collection.
History: Unknown.
Size: 39.5 cm long, 13.5 cm wide.
Description: Once owned by a prominent Wellington Maori family, this club follows the previous pattern already established but has the variation of kowhaiwhai carved on the lower part of the blade and a takarangi spiral on the upper blade. While the figure adheres to the type already seen above, it has the extra detail of a cross within circle on the wrist, as seen on a walking stick and dart thrower by Jacob. This club is very light and is not as well finished as Jacob's other work.

26. Celluloid? club, wahaika. Figure 36.
Repository: Field Museum, Chicago. 88531.
Provenance: Previously T.E. Donne collection.
History: Unknown.
Size: Not available.
Description: Of the same form as the previous two clubs, but with more elaborate surface decoration. All the blade is covered with rauponga spirals and even the handle bears low-relief kowhaiwhai. Another unusual touch is the row of small teeth around the mouth of the figure, matching those carved by Jacob in the mouths of many of the terminal heads on his treasure boxes. Tests conducted at the Field Museum have suggested that this example consists of celluloid (J. Terrell, pers. comm. December 1990) but it is not known whether Jacob actually carved celluloid or whether it is a cast made in a celluloid substance.

Figs. 33-38. Hand clubs. 33. Catalogue 23. 34. Catalogue 24. 35. Catalogue 25. 36. Catalogue 26. Photo: Field Museum, Chicago. 37. Catalogue 27. 38. Catalogue 28.

27. Whalebone club, patu paraoa. Figure 37.
Repository: Auckland Museum 38783.
Provenance: Cadman Collection.
History: Unknown.
Size: 37 cm long, 9 cm wide.
Description: Belonging to the Cadman Collection, this club has the standard form of a patu paraoa but with the addition of a manaia head at the butt, similar to those on several of the wahaika above. This patu is well-balanced and finely shaped although the carving of the manaia is unusually rough for Jacob.

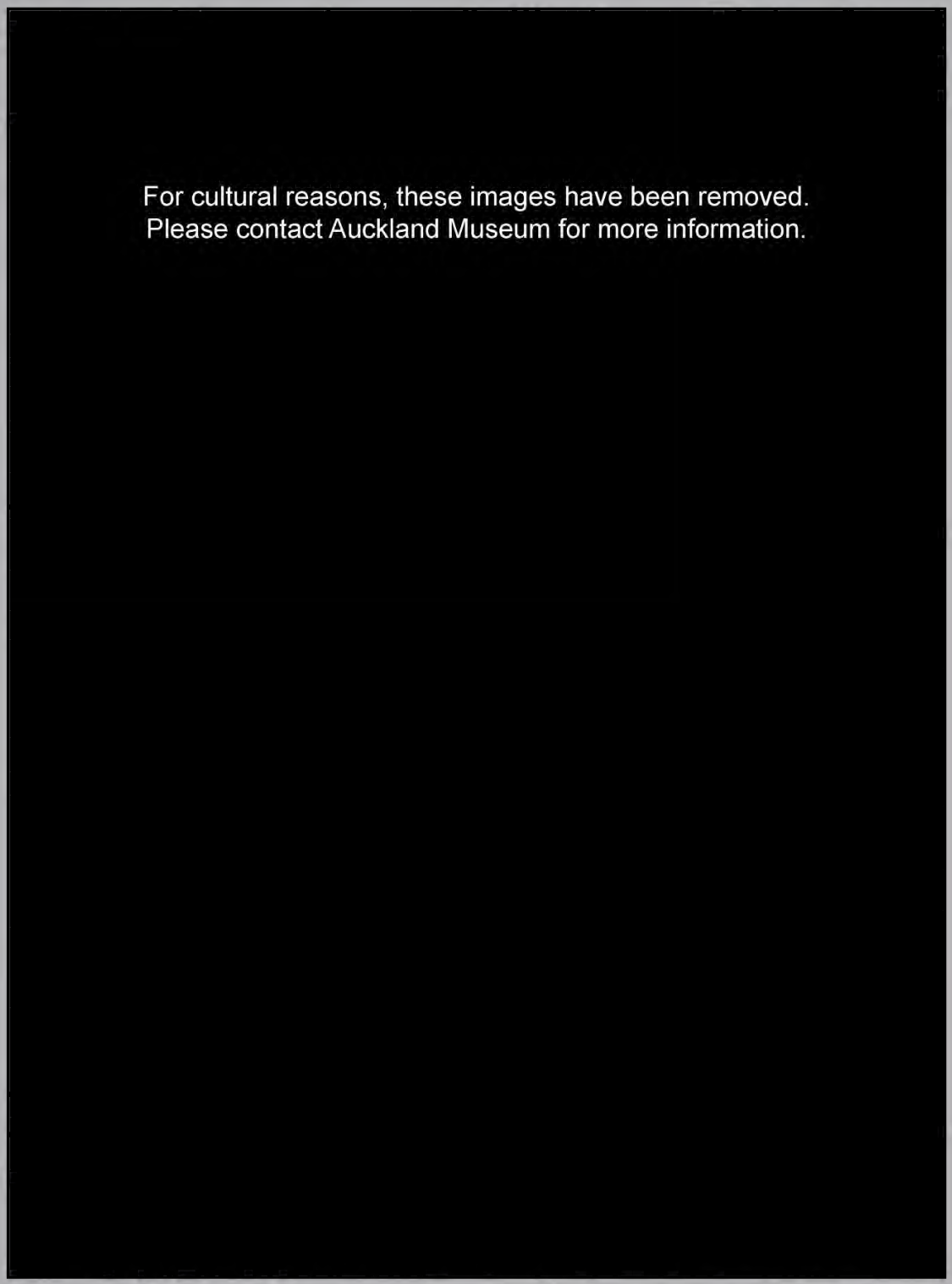
28. Wooden club, patu mako. Figure 38.
Repository: National Museum, Wellington. ME 4169.
Provenance: Sir Walter Buller collection, number 25.
History: Unknown.
Size: 41 cm long, 5.5 cm wide.
Description: Decorated with rauponga, whakarare and kowhaiwhai patterns, this circular-sectioned club was described by Buller as a patu mako, that is, a shark club. However, despite this name, it was clearly never intended to actually fulfil this purpose, but instead has become an elegant pure form.

29. Wooden long club, tewhatewha. Figure 39.
Repository: Canterbury Museum. E 141. 703.
Provenance: Probably presented by Sir Joseph Ward, Christchurch.
History: Unknown.
Size: 121.8 cm long.
Description: Carved on both sides of blade with Jacob's standard low-relief koruru face, this tewhatewha is rougher in finish than most of his other work.

30. Wooden long club, tewhatewha. Figure 40.
Repository: Auckland Museum. 38787.1.
Provenance: Cadman Collection.
History: Unknown.
Size: 128.5 cm long.
Description: This is a plain, well-shaped tewhatewha with Jacob's characteristic janus face carved on the shaft.

31. Wooden long club, tewhatewha. Figure 41.
Repository: Auckland Museum 38787.2.
Provenance: Cadman Collection.
History: Unknown.
Size: 99.5 cm long.
Description: This tewhatewha with its lightweight wood and janus face is almost identical to the above, except for its shorter length.

32. Wooden long club, tewhatewha. Figure 42.
Repository: Auckland Museum 24168.2



Figs. 39-45. Long clubs. 39. Catalogue 29. Photo: C. Jacomb. 40. Catalogue 30. 41. Catalogue 31. 42. Catalogue 32. 43. Catalogue 33. 44. Catalogue 35. 45. Catalogue 36.

Provenance: Mrs Alice Weston
History: Unknown.
Size: 135 m long.
Description: With no history, this tewhatewha can be attributed to Jacob by virtue of the janus face on the shaft and even more definitely by the figure carved into the shaft at the junction of the blade. This figure is a standard type from Jacob's repertoire, but its location here on the shaft is an unsuccessful innovation. The pierced carving has so weakened the shaft that it is totally non-functional and in fact is now broken at this juncture.

33. Whalebone long club, tewhatewha. Figure 43.
Repository: National Museum, Wellington. ME. 12047.
Provenance: Pain Collection, Martinborough, Wairarapa.
History: Unknown.
Size: 117 cm.
Description: A plain well-shaped tewhatewha with janus head on shaft.

34. Whalebone long club, tewhatewha.
Repository: National Museum, Wellington. ME. 12048.
Provenance: Pain Collection, Martinborough, Wairarapa.
History: Unknown.
Size: 102 cm long.
Description: Like the above, this plain tewhatewha is well-shaped with a restrained janus head set on the shaft. It has also been fitted with a bunch of feathers as appropriate for this weapon.

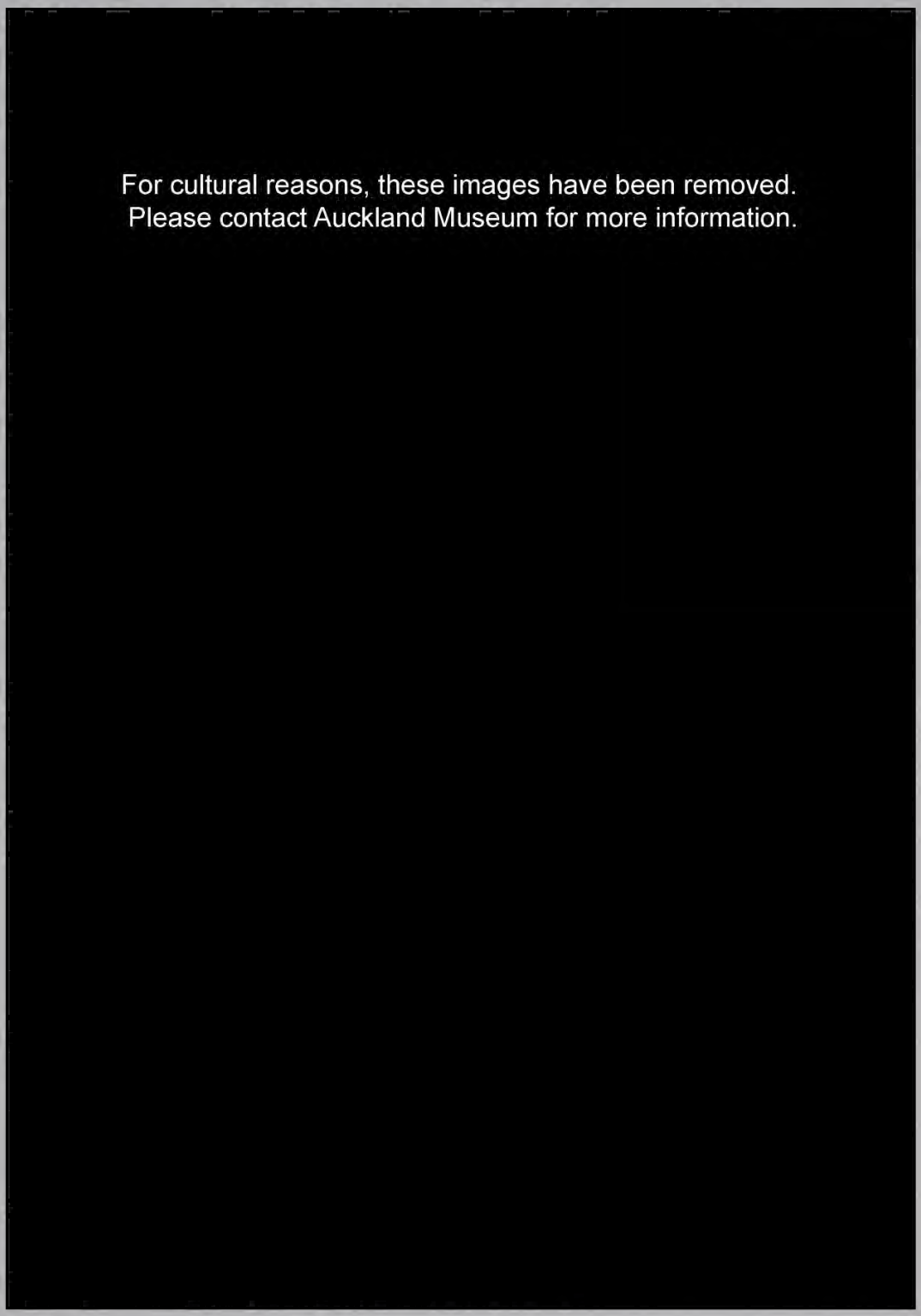
35. Wooden long club, taiaha. Figure 44.
Repository: Auckland Museum. 38788.
Provenance: Cadman Collection.
History; Unknown.
Size: 181 cm long.
Description: The head is carved according to the traditional composition for a taiaha except for the substitution of a flat pointed oval of rauponga instead of the correct nose.

36. Whalebone long club, taiaha. Figure 45.
Repository: National Museum, Wellington. ME. 4226A.
Provenance: Unknown.
History: Unknown.
Size: 141.8 cm long.
Description: In basic form, the head of this bone taiaha is very similar to Jacob's wooden taiaha above, but with some variation in the treatment of the nose and upper lip. Appropriate feather decorations have been attached, presumably by Jacob.

37. Dart thrower, kotaha. Figure 46.
Repository: National Museum, Wellington. ME.2944.
Provenance: Unknown.

History: Copied from original in British Museum (NZ 75).
Size: 156 cm long.
Description: Genuine kotaha are very rare in Maori collections in New Zealand museums. Consequently, the examples in the British Museum were of great interest to New Zealand ethnologists. Anaha Te Rahui of Rotorua was commissioned to reproduce replicas (now in Auckland Museum) of these from photographs and apparently Jacob was also. However, Jacob's replica of British Museum kotaha number NZ 75, collected on one of Captain Cook's voyages is very different to Anaha's replica of this same kotaha. Both Jacob and Anaha worked from photographs although Anaha may also have had the advantage of a plaster cast, but their totally dissimilar results are very instructive for an understanding of the different skills and training of these two men. Anaha with his traditional training, artistic discipline and experience, produced a truly three-dimensional replica that is very faithful to the original. Jacob on the other hand, without this traditional training and discipline, has interpreted the two-dimensional photograph with an essentially two-dimensional carving. Where Jacob has not understood the three-dimensional aspect or the complex figural composition, he has improvised, producing a falsely domed head, a strange looped lip, a hand that is disjointed from its arm, and a leg that is scarcely recognisable, being reduced to a series of spirals and rauponga ending in the displaced hand.

38. Wooden paddle, hoe. Figure 47.
Repository: National Museum, Wellington. ME.2407.
Provenance: Sir Walter Buller Collection.
History: Copied from original in Dresden Museum.
Size: 197.3 cm long, 16.5 cm wide.
Description: Carved for Sir Walter Buller as a copy of a remarkable paddle which the Dresden Museum had recently purchased from an English dealer for seventy-five pounds. The original paddle had been obtained in the Bay of Islands in 1836 from the Ngapuhi chief Titore but the style is not noticeably northern. Augustus Hamilton had published a drawing and description of this paddle in 1896 (Hamilton 1896:40, Fig. 1) based on an illustration issued by the Dresden Museum and the paddle had obviously attracted the attention of New Zealand collectors and museum curators. Within a very short time, several Wellington area collectors such as Walter Buller, Alexander Turnbull and Alfred Cadman all had modern copies or variations based on this paddle in their collections. All of these copies can be attributed to Jacob Heberley who must have incorporated this style of paddle into his repertoire very quickly. At this time, it is not known whether Jacob started making these paddles on his own initiative or whether he was



Figs. 46-53. 46. Dart thrower. Catalogue 37. 47-53. Paddles. 47. Catalogue 38. 48. Catalogue 39. 49, 50. Catalogue 40. 51, 52. Catalogue 41. 53. Catalogue 42.

first commissioned to reproduce them for the collectors. It is known that Jacob was selling unspecified carvings and even an ancestral hei-tiki to Sir Walter Buller at about this time (note by Sarah Heperi, Auckland Museum Ethnology files).

Judging by Hamilton's drawing of the original paddle, this Wellington paddle (ME. 2407) is a fairly faithful copy. At the top of the handle is a plain raised knob and where the handle diverges into two shafts there is a janus head carved on each shaft. At the loom of the blade, a face with paua shell eyes is carved above the deep notch so characteristic of the Dresden paddle. On the upper surface of the blade, Jacob has reproduced the whakarare pattern and the low-relief embracing figures.

39. Wooden paddle, hoe. Figure 48.
Repository: National Museum, Wellington. ME. 2605.
Provenance: Alexander Turnbull Collection.
History: Copied from original in Dresden Museum.
Size: 198.5 cm long, 15.3 cm wide.
Description: Another copy of the Dresden paddle, this one was owned by Alexander Turnbull and Jacob has again faithfully reproduced all the features of the Dresden paddle.

40. Wooden paddle, hoe, Figures 49, 50.
Repository: Auckland Museum. 38789.
Provenance: Cadman Collection.
History: Copied from original in Dresden Museum.
Size: 203 cm long, 17.4 cm wide.
Description: Part of the Cadman bequest, this is a third close copy of the Dresden paddle.

41. Wooden paddle, hoe. Figures 51, 52.
Repository: Auckland Museum. 6911.
Provenance: E. Brown Collection.
History: Variation on the Dresden paddle.
Size: 201.5 cm long, 15.5 cm wide.
Description: Part of a large collection originating from several prominent Wellington Maori families, this paddle is a variation on the Dresden paddle. Like all of Jacob's other paddles, this is an ornate presentation piece never meant to be used as a functional paddle. At the top of the handle is a naturalistic male face with tattoo and shell eye insets (now missing). Halfway along the handle shaft is a janus face in low relief rauponga, of the same type that Jacob used on his walking sticks and tewhatewha. The curved upper surface of the blade bears a large koruru face, low relief kowhaiwhai and a smaller full length figure at the loom, all in rauponga. A band of whakarare runs along the lip of a raised lower portion of the blade. At the loom, Jacob has retained the characteristic deep notch of the Dresden paddle.

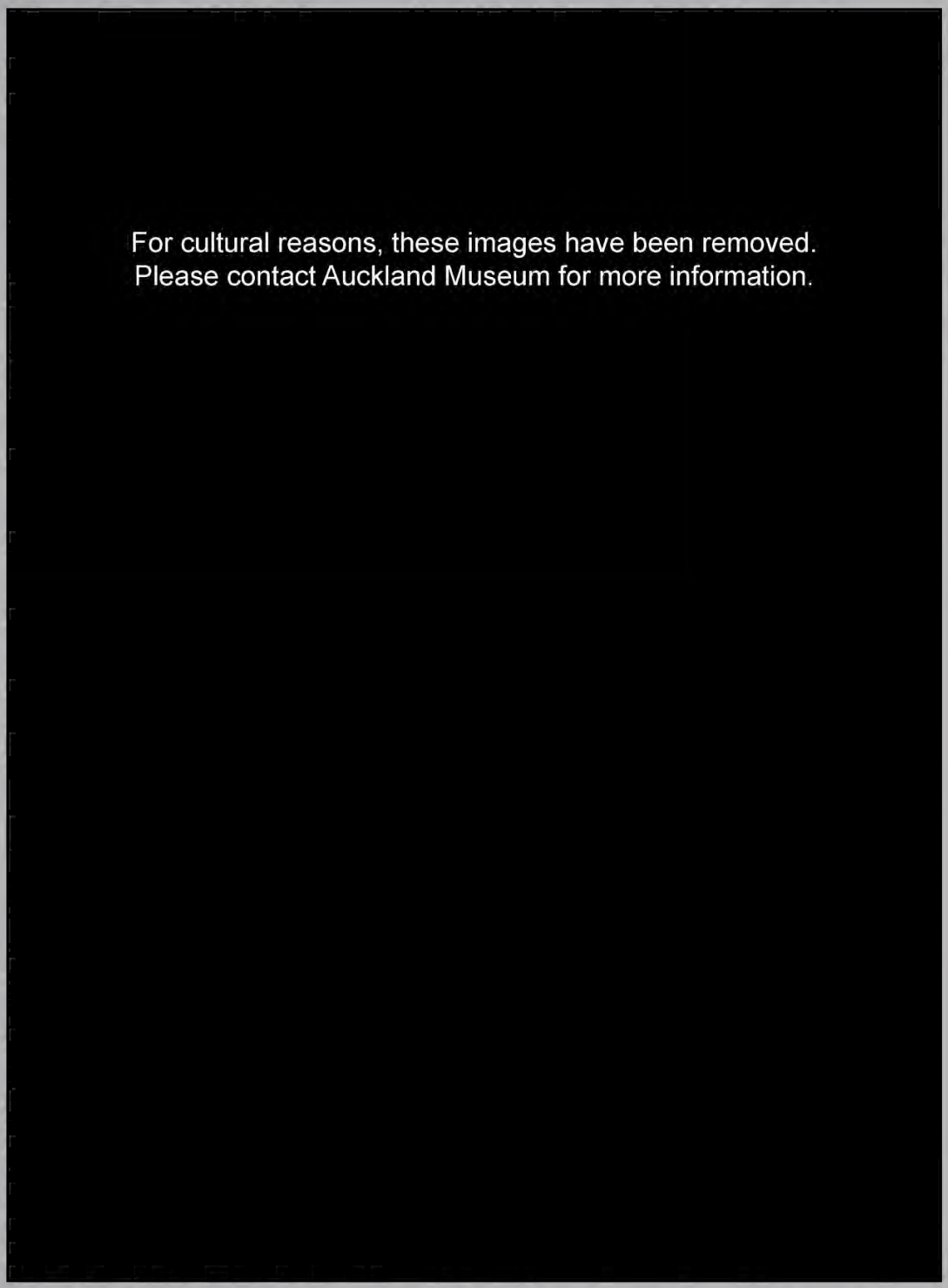
42. Wooden paddle, hoe. Figure 53.
Repository: National Museum, Wellington. ME.2408.
Provenance: Sir Walter Buller Collection.
History: Variation on the Dresden paddle.
Size: 185.2 cm long, 14.5 cm wide.
Description: Once owned by Sir Walter Buller this is another variation on the Dresden paddle model, almost identical with the Auckland Museum paddle 6911. It is distinguished by its slightly smaller size, being 185.2 cm long and by the less complex pattern of kowhaiwhai on the blade.

43. Treasure box, wakahuia. Figure 54.
Repository: Taranaki Museum, New Plymouth. A. 76.805.
Provenance Unknown.
History: Unknown.
Size: 52 cm long, 14.8 cm wide, 15 cm high.
Description: With no recorded information, this box can definitely be attributed to Jacob, although it is slightly more rounded than his usual shape and has a variant motif of rectangular rauponga-filled panels on the sides.

44. Treasure box, wakahuia.
Repository: Private collection, Wairarapa.
Provenance: Riddiford family collection.
History: Presented to Sir Julius Vogel.
Size: Not available.
Description: According to the information in a Dunbar Sloane auction catalogue for 24 April 1980, this box was presented to Sir Julius Vogel while he was Premier of New Zealand and subsequently remained in the Riddiford family for many years. It sold at Dunbar Sloane's 1980 auction for $375. This is a very standard Jacob Heberley design box with no unusual features.

45. Treaure box, wakahuia. Figure 55.
Repository: National Museum, Wellington. ME.2645.
Provenance: Alexander Turnbull collection.
History: Unknown.
Size: 50 cm long, 14.5 cm high.
Description: Standard Jacob Heberley design.

46. Treasure box, wakahuia. Figure 56.
Repository: National Museum, Wellington. ME.2646.
Provenance: Unknown.
History: Unknown.
Size: Lid 56 cm long, box 38 cm long, 9.7 cm high.
Description: Unlike all other known wakahuia by Jacob, the lid of this one has a flat protruding wheku mask at each end. The box is decorated in whakarare with a band of kowhaiwhai around the base.



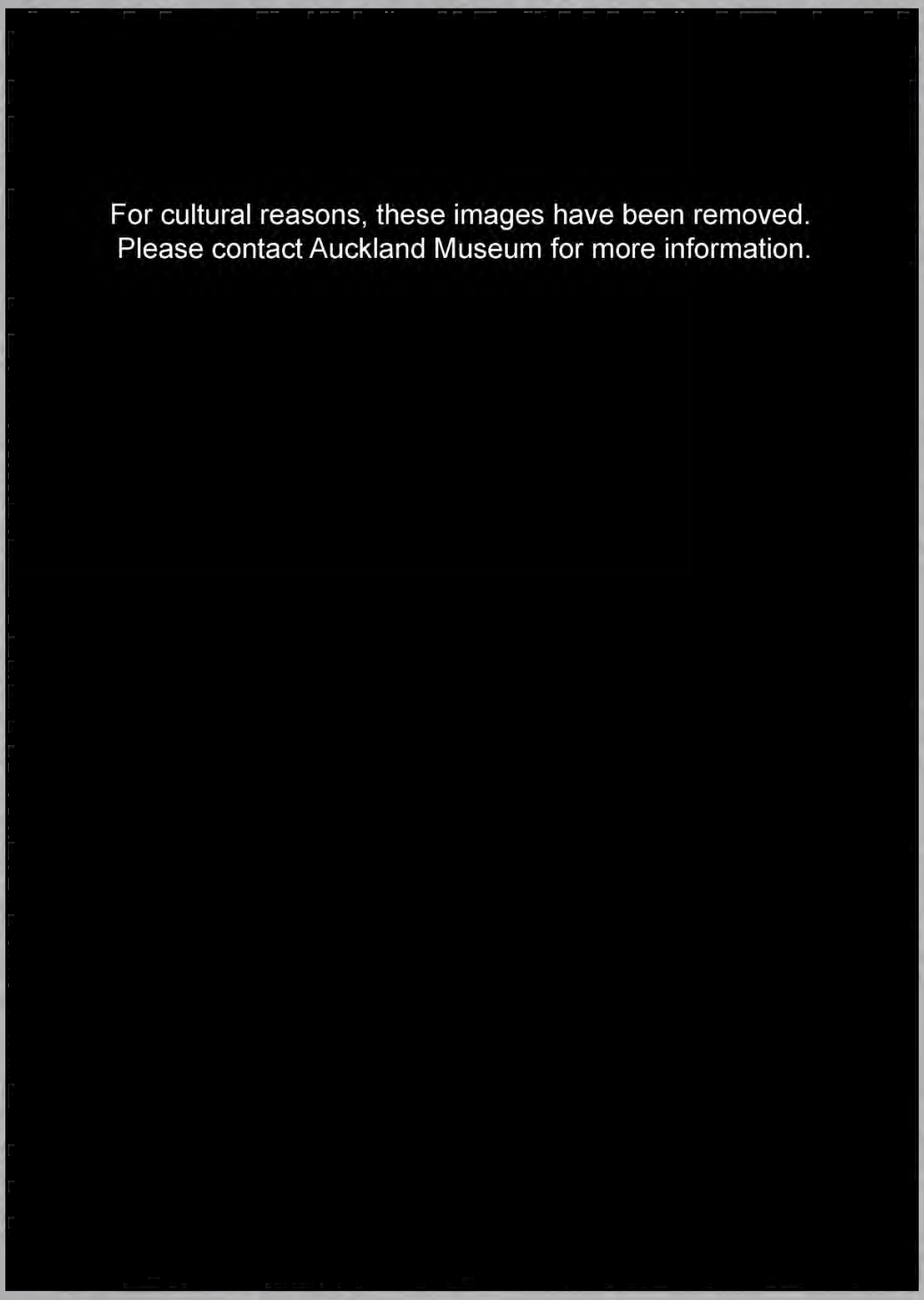
Figs. 54-57. Treasure boxes. 54. Catalogue 43. 55. Catalogue 45. 56. Catalogue 46. 57. Catalogue 47.

47. Treasure box, wakahuia. Figure 57.
Repository: National Museum, Wellington. ME.12056.
Provenance: Unknown.
History: Unknown.
Size: 51 cm long, 16 cm high.
Description: With inset lid, squared ends and protruding heads on thick necks, this box is very similar to the Seddon box (Catalogue number 9), except for the extra ruru type faces on sides and lids.

48. Afterbirth container, ipu ewe. Figure 58.
Repository: National Museum, Wellington. ME.2644.
Provenance: Alexander Turnbull Collection.
History: Unknown.
Size: 50 cm long, 14 cm high.
Description: Jacob has embellished all of the external surface of the container with whakarare and a band of kowhaiwhai around the upper portion. At each side is a typical Jacob-style koruru mask and the end has a deeply-carved wheku mask. This generous surface decoration and flat bottom mark this item as a modified replica.

49. Feeding funnel, korere. Figure 59.
Repository: Auckland Museum. 857.
Provenance: Gilbert Mair Collection, 1901.
History: Found in a hollow totara tree in the Wairarapa.
Size: 21 cm long, 10 cm wide.
Description: Reported as found in a hollow tree in the Wairarapa, this feeding funnel came into the museum as part of the Gilbert Mair collection in 1901. Virtually all known old authentic feeding funnels have come from the North Auckland district but this example is clearly not in northern carving style and is obviously a replica. On stylistic grounds, it can be attributed to Jacob Heberley as evidenced by his favourite motifs of a band of low relief kowhaiwhai, then a band of whakarare above the body of the funnel which is covered by oblique whakarare. If this attribution to Jacob is correct, this funnel would probably represent another production from Jacob's period of residence at Greytown.

50. Model free-standing figure, tekoteko. Figure 60.
Repository: American Museum of Natural History, New York. 80.1-1642.
Provenance: Purchased in 1951 from M.L.J. Lemaire, an artefact dealer in Amsterdam.
History: Unknown.
Size: 38 cm high.
Description: This tekoteko was probably made for a model house or simply as a separate model. The stylised figure set above a stylised face follows the pattern Jacob used on his walking sticks and is also similar to the tekoteko he attached to his model storehouses.



Figs. 58-61. 58. Afterbirth container. Catalogue 48. 59. Feeding funnel. Catalogue 49. 60. Free-standing figure. Catalogue 50. 61. Weaving peg. Catalogue 51.

51. Weaving peg, turuturu. Figure 61.
Repository: Hastings Cultural Centre. 595.
Provenance: George Ebbett Collection.
History: Unknown.
Size: 58 cm long.
Description: To produce this imitation of an obsolete traditional artefact, the carver, almost certainly Jacob Heberley, has simply placed his standard stylised head on a plain shaft.

52. Whalebone walking stick, tokotoko. Figure 62.
Repository: Tribal heirloom, Ruatoki.
Provenance: Shown in early photograph, held by Tupaea Rapaera, Tuhoe tribe, Ruatoki (National Museum negative B.1491).
History: Unknown.
Size: Not available.
Description: Following Jacob's basic walking stick pattern, this tokotoko is distinguished more by his choice of whalebone as a carving material. In traditional Maori terms, whalebone was a highly-valued material mainly because of its scarcity. With his family connections into the Queen Charlotte Sound whaling industry, Jacob was able to make good use of this resource.

53. Whalebone walking stick, tokotoko. Figure 63.
Repository: Unknown.
Provenance: Photograph supplied by W.O. Oldman, London.
History: "Owned by Paraone Pahoia, chief of Wairarapa".
Size: Unknown (reported size must be an error).
Description: This tokotoko is now known only from an archival photograph held by the Rautenstrauch-Joest Museum in Cologne (photograph number 635). An archival note to this photograph written on 15 August 1906 records that this walking stick was "originally the property of Paraone Pahoia, chief of Wairarapa, North Island, New Zealand, length 86 ½ inches, 5 inches across". The photograph was suppliedby W.O. Oldman, the London dealer, in August 1906, taken from the original stick in his possession. Paraone, also known as Paraire Pahoia was a chief who lived in the Greytown district in the later years of the nineteenth century.

Elegantly carved in whalebone instead of the usual wood, this tokotoko follows Jacob's standard walking stick design with looped handle, stylised upper figure with head below, incised kowhaiwhai along the shaft and a janus head below. Nevertheless, Jacob has again ingeniously managed to make each stick slightly different in interesting details.

54. Whalebone walking stick, tokotoko. Figure 64.
Repository: Unknown.
Provenance: Sold by Sotheby's New York, on Tuesday 18 November 1986 for $1,650 (US).

62 63 64

Figs. 62-64. Whalebone walking sticks. 62. Catalogue 52. Photo: National Museum. 63. Catalogue 53. Photo: Rautenstrauch-Joest Museum, Cologne. 64. Catalogue 54. Photo: Courtesy of Sotheby's, New York.

History: Unknown.
Size: 84.4 cm long.
Description: Known only by the photograph in the catalogue for this auction (Lot 39), this stick can be safely attributed to Jacob, even though the upper figure has had the head broken away. Unlike Jacob's other tokotoko, this one has two stylised figures of indeterminate sex with some unusual details of legs and head on the lower figure.

55. Wooden walking stick, tokotoko. Figures 65, 66.
Repository: Hastings Cultural Centre. 716.
Provenance: George Ebbett Collection.
History: Purchased on Norfolk Island.
Size: 94.5 cm long.

Description: George Ebbett, a local Hawkes Bay collector, obtained this tokotoko on Norfolk Island. Its earlier history is unknown but it can clearly be attributed to Jacob Heberley. This stick is a very fine example of Jacob's style, with his naturalistic male figure at the top and an unusually expressive stylised figure below which is surprisingly reminiscent of early Taranaki entwining patterns. On the powerful elongated hand of this lower figure, Jacob has introduced an unusual motif of a cross-within-circle and this recurs on the hand of the male figure above. Jacob introduced the same motif on his kotaha (Catalogue number 37). This cross-within-circle motif is very rare in Maori woodcarving; one other prominent example appears in Taraia meeting house at Pakipaki, Hawkes Bay, possibly seen by Jacob.

56. Wooden walking stick, tokotoko. Figure 67.
Repository: Private collection, Auckland.
Provenance: Still held by descendant of Jacob.
History: Unknown.
Size: 94 cm long.
Description: This walking stick, tokotoko is almost identical to the one above (Catalogue number 55) both in size and design. Such reproduction of exactly the same tokotoko composition is most unusual among all the known work of Jacob who usually managed to introduce some variation in the minor details at least.

57. Wooden walking stick, tokotoko. Figure 68.
Repository: Hastings Cultural Centre. 718.
Provenance: George Ebbett Collection.
History: Purchased by Ebbett in 1910.
Size: 91.5 cm long.
Description: Collection records and an old display label claim that this walking stick was carved by the same carver who had worked on Rauru meeting house for C.E. Nelson at Rotorua in 1900. This is obviously a confusion, as the stick can be confidently attributed to Jacob Heberley and is clearly not the work of Anaha Te Rahui, Tene Waitere or Neke Kapua, all of Ngati Tarawhai, who were employed by Nelson on Rauru. However, this information is interesting if it indicates that the stick was collected at Rotorua. The stick was purchased for the collection in 1910. In this case, Jacob has given the upper figure a stylised face instead of the usual naturalistic one.

58. Wooden walking stick, tokotoko. Figure 69.
Repository: Auckland Museum. 38786.1.
Provenance: Cadman Collection.
History: Unknown.
Size: 94.5 cm long.

Description: This tokotoko displays a stylised figure with naturalistic male tattooed face, standing on a manaia head. Below this a section of rauponga and whakarare continues down to a janus face carved in whakarare.

59. Wooden walking stick, tokotoko. Figure 70.
Repository: Auckland Museum. 38786.2.
Provenance: Cadman Collection.
History: Unknown.
Size: 89 cm long.
Description: One of Jacob's more complex tokotoko compositions, this stick is shorter than most. The top figure is the usual tattooed male, standing above a stylised female. Below her is a manaia head with Jacob's bulbous tongue and numerous teeth. Below this again are two bands of elaborate surface decoration followed by low relief kowhaiwhai ending in a janus face. The surface decoration on this stick is extremely intricate and finely finished.

60. Wooden walking stick, tokotoko. Figure 71.
Repository: Auckland Museum. 38786.3.
Provenance: Cadman Collection.
History: Unknown.
Size: 89.6 cm long.
Description: This is the third tokotoko of the Cadman collection and follows very closely on the composition of the stick above, except that here the female figure is naturalistic, being very similar to the female on the tokotoko in the Australian Museum (Catalogue number 61).

61. Wooden walking stick, tokotoko. Figures 72, 73.
Repository: Australian Museum, Sydney. E 54527.
Provenance: Unknown.
History: Unknown.
Size: Not available.
Description: This walking stick has the usual loop handle favoured by Jacob, and his standard naturalistic male figure above a naturalistic female, both with the appropriate traditional tattoo indicated. The male has the fine additional detail of two feathers carved on to his forehead and the female is exceptionally naturalistic, perhaps even with playful erotic overtones.

62. Wooden walking stick, tokotoko. Figure 74.
Repository: Private collection, Wairarapa.
Provenance: Unknown.
History: Unknown.
Size: 94 cm long.

Figs. 65-73. Walking sticks. 65, 66. Catalogue 55. 67. Catalogue 56. 68. Catalogue 57. 69. Catalogue 58. 70. Catalogue 59. 71. Catalogue 60. 72, 73. Catalogue 61.

Description: This walking stick follows Jacob's standard pattern with a naturalistic male face on a stylised body surmounting a larger stylised face with sophisticated swirling rauponga surface patterns. This stick is a fine example of Jacob's sureness of line and deftness of chisel cuts.

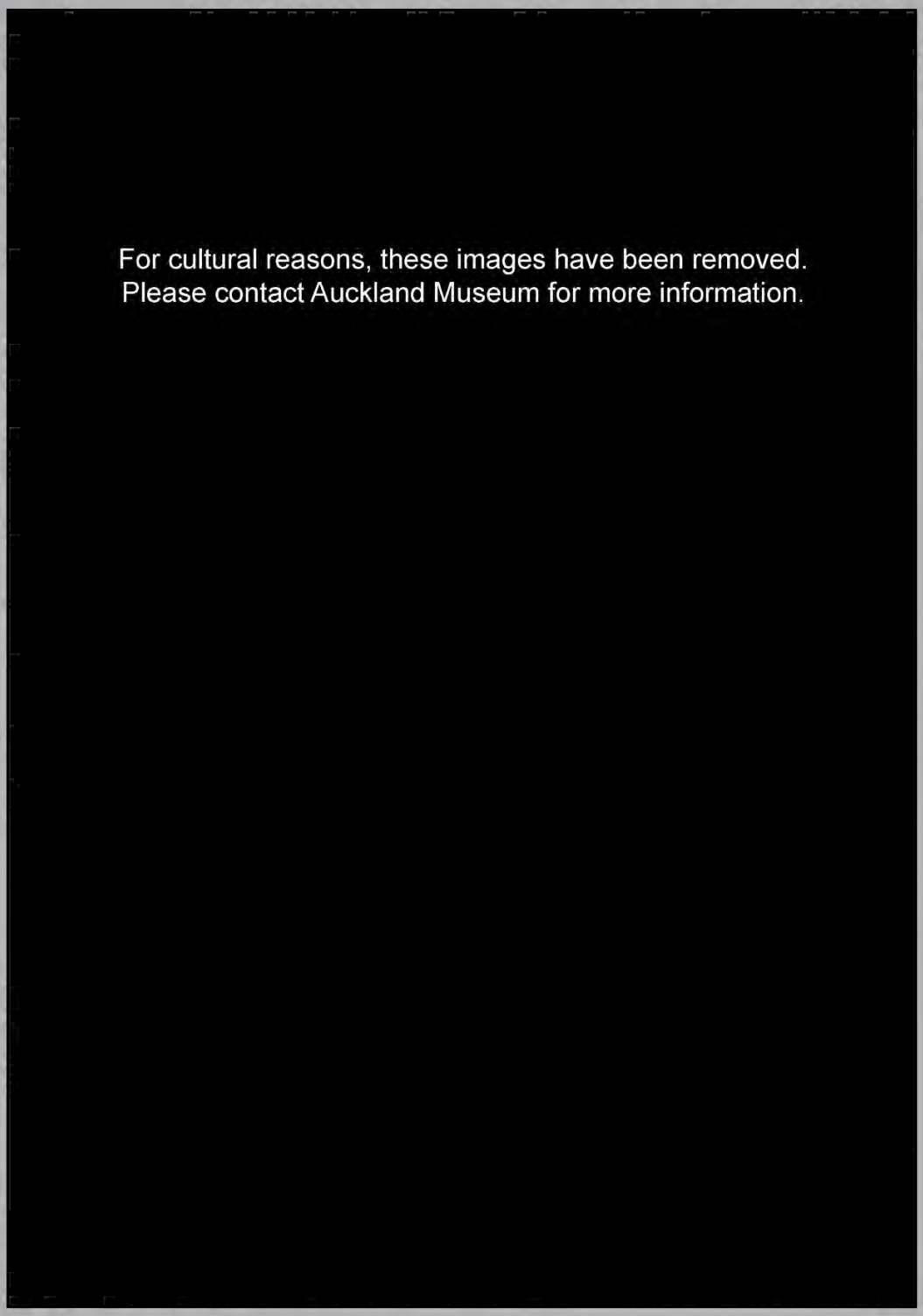
63. Wooden walking stick, tokotoko. Figure 75.
Repository: Private collection, Wairarapa.
Provenance: Unknown.
History: Unknown.
Size: 94 cm long.
Description: Also 94 cm long, this stick has the same composition as the other in this collection (Catalogue number 62), except for a stylised face on the upper figure. The lower manaia face has Jacob's bulbous tongue motif, used so often on his treasure boxes.

64. Wooden walking stick, tokotoko. Figure 76.
Repository: National Museum, Wellington. ME.8092.
Provenance: Hunter family bequest, 1956.
History: Unknown.
Size: 90.5 cm long.
Description: A stylised male figure stands above a manaia face and the rest of the shaft is decorated with incised kowhaiwhai and rauponga.

65. Wooden walking stick, tokotoko. Figure 77.
Repository: National Museum, Wellington. ME.13945.
Provenance: Unknown.
History: Unknown.
Size: 97 cm long.
Description: In this standard Jacob tokotoko composition, a male figure with tattooed naturalistic face stands above a stylised manaia head. The circular shell eyes have been given Jacob's careful notched edges.

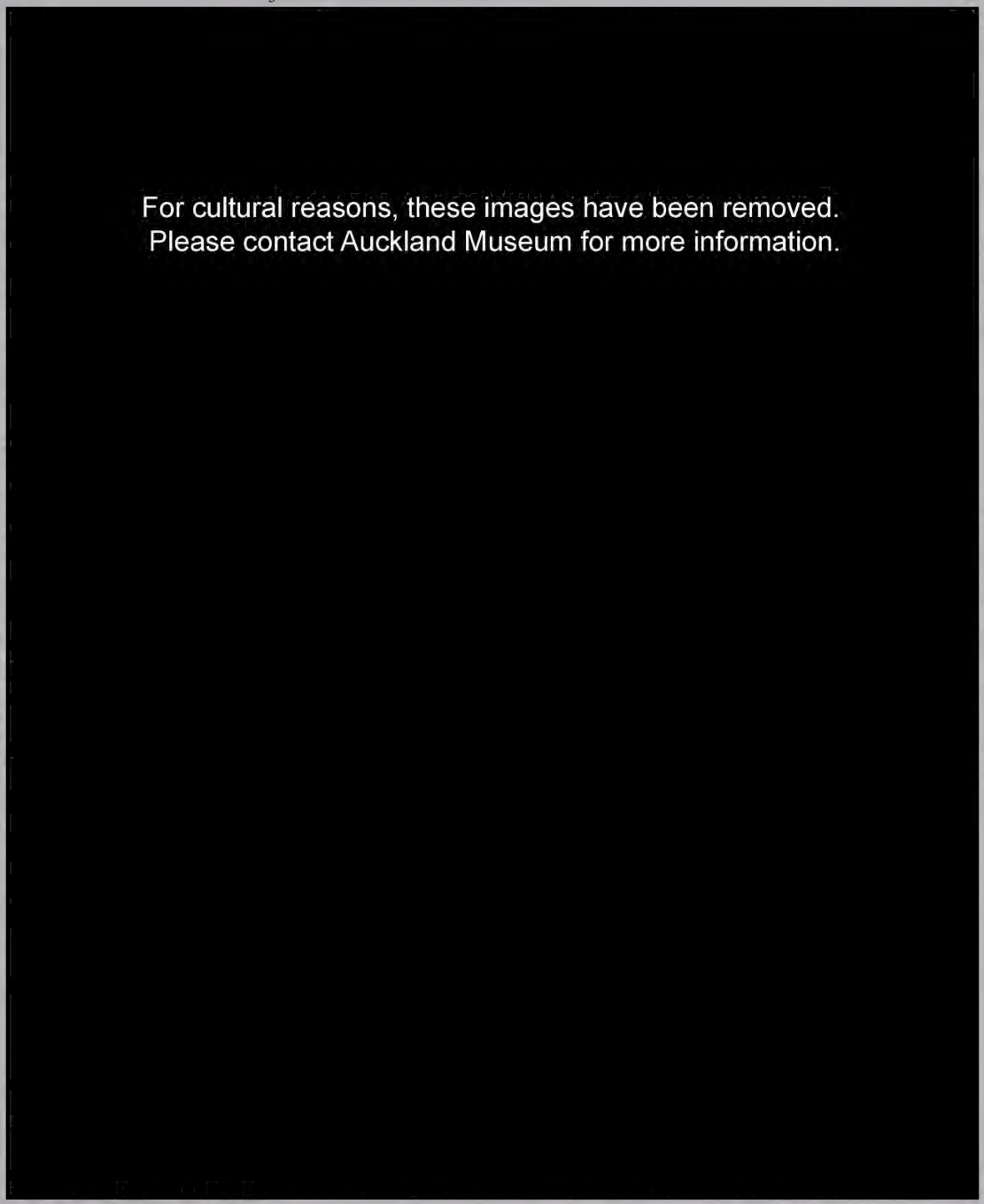
66. Wooden walking stick, tokotoko. Figure 78.
Repository: National Museum, Wellington. ME. 13946.
Provenance: Unknown.
History: Unknown.
Size: 90 cm long.
Description: This stick has Jacob's standard composition of a stylised male figure above a stylised face.

67. Wooden walking stick, tokotoko. Figure 79.
Repository: National Museum, Wellington. Deposit D.129
Provenance: Private collection, Martinborough.
History: Unknown.
Size: 94.6 cm long.



Figs. 74-79. Walking sticks. 74. Catalogue 62. 75. Catalogue 63. 76. Catalogue 64. 77. Catalogue 65. 78. Catalogue 66. 79. Catalogue 67.

Description: This is one of the finest tokotoko carved by Jacob, although the composition is his usual standard male figure above a stylised manaia. The shaft is decorated with incised kowhaiwhai and a janus head at the bottom.



Figs. 80-83. 80, 81. Bone combs. 80. Catalogue 68. 81. Catalogue 69. 82, 83. Bone pendants. 82. Catalogue 70. 83. Catalogue 71.

68. Bone comb, heru. Figure 80.
Repository: National Museum, Wellington. ME.12074.
Provenance: Pain collection, Martinborough.
History: Unknown.
Size: 22 cm long, 7.5 cm wide.
Description: This flat piece of bone has been carved on both sides with two full-length figures of the same composition as Jacob's stylised tokotoko figures. The two wheku masks separating these figures are also standard Jacob types, almost identical to the mask reproduced on Jacob's whalebone wahaika in the Cadman collection (Catalogue number 24). The final product is a non-functional creation, inspired by a traditional form but diverging widely from the original.

69. Bone comb, heru. Figure 81.
Repository: Auckland Museum 38784.
Provenance: Cadman collection.
History: Unknown.
Size: 21.8 cm long.
Description: This comb is very similar to the Pain comb (Catalogue number 68), varying only in the kneeling stance of the two flanking figures separated by one wheku mask.

70. Bone pendant. Figure 82.
Repository: National Museum, Wellington. ME.12073.
Provenance: Pain collection, Martinborough.
History: Unknown.
Size: 9.1 cm long, 6 cm wide.
Description: With no direct traditional antecedents, this pendant is an innovative composition carved on both sides of the bone. The upper bodies of the flanking figures are based on Jacob's male tokotoko figures with naturalistic tattooed face and the wheku mask between is the same as used on his bone combs.

71. Bone pendant. Figure 83.
Repository: Private collection, Wellington.
Provenance: Unknown.
History: Unknown.
Size: 6 cm long, 4.3 cm wide.
Description: This beautifully finished pendant is notably smaller than the above and displays the same jewel-like quality as Jacob's pendant in the form of a wahaika (Catalogue number 8). Set with paua shell eyes, the two outward facing heads reproduce in miniature the same faces that he carved on the handles of full-size clubs, while the central face is a simplification of Jacob's standard wheku mask.

72. Bone cloak pin, aurei. Figure 84.
Repository: National Museum, Wellington. ME.2767.2

Provenance: Alexander Turnbull collection.
History: Unknown.
Size: 16 cm long.
Description: This finely-carved cloak pin can be confidently attributed to Jacob on the basis of the janus mask which is identical to the mask used by Jacob on his walking sticks and tewhatewha. His neat polished paua shell eye inserts have a jewel-like quality, reflecting Jacob's skill at small intricate detailing.

73. Bone cloak pin, aurei. Figure 85.
Repository: National Museum, Wellington. ME.11985.
Provenance: Unknown.
History: Unknown.
Size: 16.6 cm long.
Description: This pin is attributed to Jacob for the same reasons as the pin above (Catalogue number 72).

Figs. 84-87. Bone cloak pins. 84. Catalogue 72. 85. Catalogue 73. 86. Catalogue 74. 87. Catalogue 75.

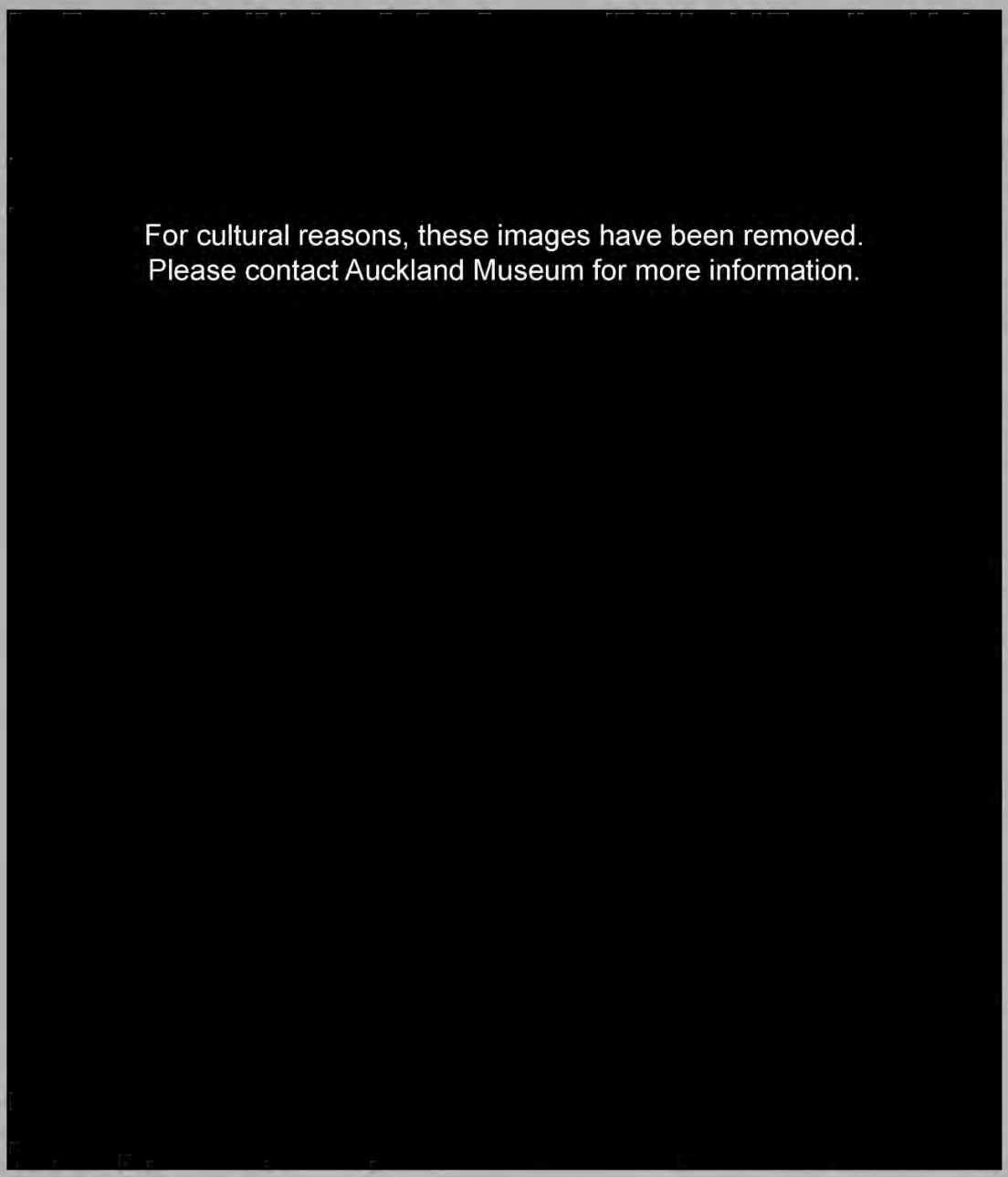
74. Bone cloak pin, aurei. Figure 86.
Repository: National Museum, Wellington. ME. 11984.
Provenance: Unknown.
History: Unknown.
Size: 16.8 cm long.
Description: Although the wheku face on this pin has no direct correlates among Jacob's other carvings, the details of technique and style mark it as Jacob's work.

75. Bone cloak pin, aurei. Figure 87.
Repository: National Museum, Wellington. ME.14987.
Provenance: Unknown.
History: Unknown.
Size: 16.6 cm long.
Description: As on the other pins, the hand of Jacob is evident in the style and technique of the face carved on the pin.

76. Tinder box. Figures 88, 89.
Repository: National Museum, Wellington. ME.15530.
Provenance: Private collection, Wellington.
History: Unknown.
Size: 16 cm long, 8 cm high.
Description: Displaying Jacob's characteristic type of male tattooed face and whakarare surface decoration, this container is a replica of an established traditional form. Usually described as a tinder box, such containers have also been interpreted as holders for trinkets, tattooing chisels or pigment. The National Museum purchased this box at a Dunbar Sloane auction in 1991 for $7,000.

77. Tinder Box. Figure 90.
Repository: Auckland Museum. 37517.
Provenance: Presented by A.T. Williams, 1968.
History: Said to have been owned by Archdeacon Henry Williams (Archey 1977:80).
Size: 16 cm long, 9 cm high.
Description: Apart from a few minor differences of surface decoration and the use of Jacob's usual neat paua shell eye inserts, this tinder box is virtually identical in size and form to the other box (Catalogue number 76). Both these boxes are fine examples of Jacob's skill and attention to detail.

If this box was actually owned by Henry Williams who died in 1867, this would imply a very early date for a work by Jacob Heberley. In view of all the other evidence of Jacob's carving career, a supposed pre-1867 date must be highly suspect. It must be assumed that the box was added to Henry Williams' family collection sometime after his death.



Figs. 88-90. Tinder boxes. 88, 89. Catalogue 76. Photos: R. Watt. 90. Catalogue 77.

OTHER CONTEMPORARY CARVERS

Many other Maori carvers around the country were producing bowls, treasure boxes, replica weapons, models and walking sticks for the commercial market, during the same years as Jacob. Unfortunately many of these carvings are now very poorly documented and in most cases we do not even know the names of their creators. However, there were some carvers contemporary with Jacob whose work is known and represented in museum collections (Fig. 91). Jacob was the only producer of these commercial items in the Wellington area, but it is important to look at the work of these others, firstly because their work is often confused with Jacob's and secondly because their stylistic development may be related to Jacob's own evolution of a distinctive personal style, or at least show a parallel evolution. It has been claimed (Neville Gilmore, pers. comm. February 1991) that Jacob's brothers were also carvers, but this has not been substantiated (E. Chambers and C. Heberley, pers. comm. 14 May 1991).

Piwiki Horohau who worked at Porirua and Otaki has already been mentioned but an examination of a tobacco container (Fig. 92) carved by him clearly shows that he and Jacob were following quite different stylistic paths.

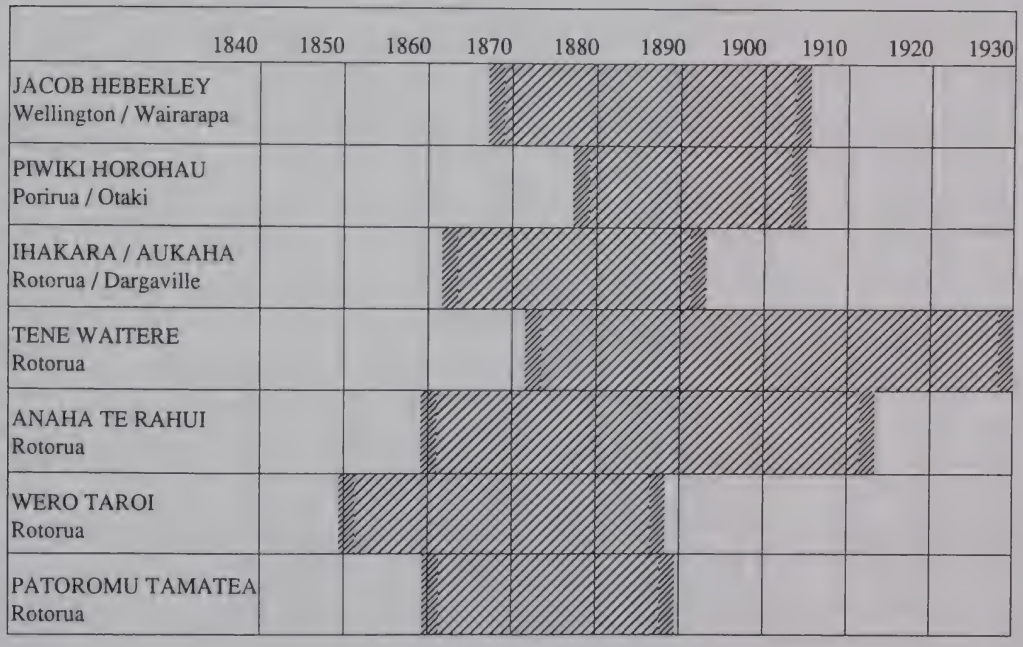


Fig. 91. Periods of carving activity of contemporary carvers.

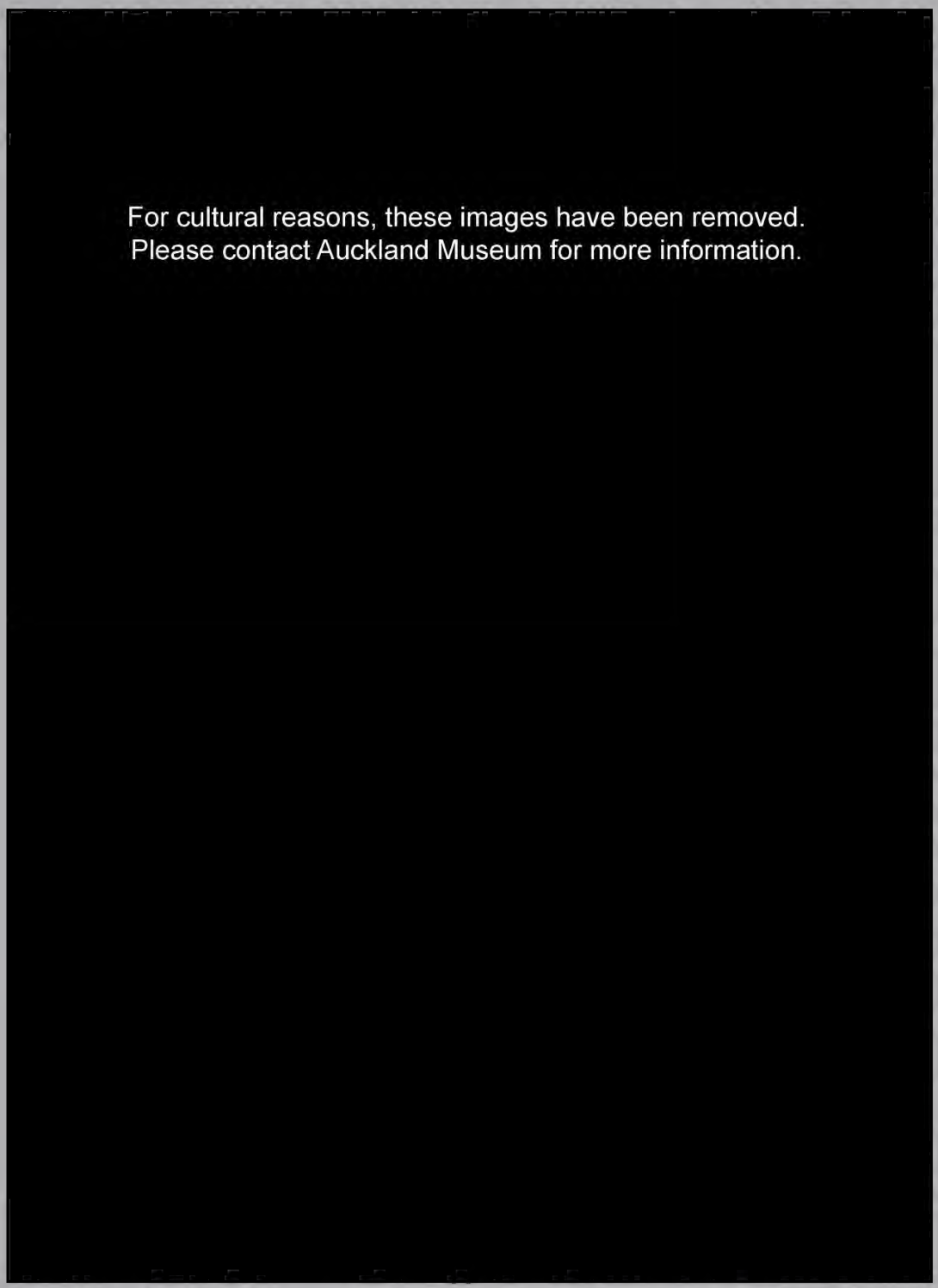
Much of the production of these items for the commercial market was concentrated among Te Arawa tribal carvers in the Rotorua area where the tourist demand was greatest. Ngati Whakaue carvers at Ohinemutu were involved in this production but documentation on their output is scarce. Ngati Pikiao and Ngati Tarawhai carvers working around the southern shores of Lake Rotoiti and at Rotorua township or Ohinemutu seem to have dominated the market.

Fig. 92. Tobacco container carved by Piwiki Horohau at Wellington. Auckland Museum.

When Meade visited Maketu and was entertained by Te Arawa there in December 1864, he noticed a "carved wooden vase" and commented that "these urns were very carefully carved, and handed down from father to son; but since the introduction of European utensils, the art of carving the wooden vases has been lost" (Meade 1870:19). Obviously, Meade misjudged the vitality of this art. As soon as tourism to Rotorua began in the early 1870s with the opening up of roads from Tauranga and Maketu (Stafford 1967:501-12), Europeans began buying Maori carvings to take home as souvenirs. Ngati Tarawhai and Ngati Pikiao were in the forefront of this development of 'tourist art'. By the 1880s and later, it is known that Patoromu, Ihakara, Anaha Te Rahui, and probably Wero Taroi were carving ornate bowls for Gilbert Mair at Taheke and Ruato (Neich 1977:228).

By the turn of the century, the Ngati Tarawhai carving group of Anaha Te Rahui, Neke Kapua and Tene Waitere were very active in the tourist market, carving rifle butts, tobacco pipes, walking sticks, replica weapons, paddles, bowls and treasure boxes. Their individual styles are well-known and can now be clearly distinguished from the work of Jacob Heberley. Ornate figure-supported bowls were a specialty of Anaha and one such famous kumete colloquially known as "the two wrestlers" (Auckland Museum 106) will serve as an example of Anaha's style (Fig. 93). The two figures carved on the lid are said to represent two chiefs fighting over the ownership of the Tikitere lands near Rotorua. Anaha worked firmly within the Ngati Tarawhai carving tradition and indeed was a major shaper of that style during his long carving career (Neich 1990a). Tene Waitere carved a very wide range of objects both for the tourist trade and for Maori clients (Neich 1990). Included within that range, Tene produced round or oval figure-supported kumete (Simmons 1982: Plate 164) and elongate wakahuia shaped treasure boxes standing on smaller terminal figures (Simmons 1982: Plate 37, i). Tene's treasure boxes have a very superficial similarity to Jacob's but apart from obvious differences in carving style, the structural concept of their boxes is dissimilar. Jacob's treasure boxes sit on a flat base with protruding heads at each end, while Tene's boxes are supported free of the ground by their full-length terminal figures. Wero Taroi, an older Ngati Tarawhai carver who taught these younger men (Neich 1990b), is also said to have carved ornate bowls for the commercial market. A large bowl with terminal figures supported on a dog (Gilbert Mair collection, Auckland Museum, now Otago Museum D.40.318) has sometimes been regarded as the work of Wero but this is only an attribution (Fig. 94).

Another prominent carver linked with the Ngati Tarawhai carvers working at Ruato was Aukaha Wharepouri, also known as Ihakara, who belonged to Ngati Pikiao and probably had Ngati Tarawhai connections as well. His daughter, Tuhi Ihakara, was born in 1866 which may indicate that Aukaha was active as a carver by that time. Gilbert Mair described him as "old Ihakara" in 1885. His descendants understand that Aukaha was self-taught but he was accepted as an important tribal carver (Mrs Marama Graham, pers. comm. 22 August 1979). His name is associated with that of Patoromu Tamatea and other Ngati Tarawhai carvers who were working around Lake Rotoiti and Rotorua during the 1880s. Aukaha lived for some time in Dargaville, probably in about the 1870s, where his daughter Tuhi married Charles Black. Aukaha continued carving while he lived in Dargaville and much of his work was in the collection of John Black of Te Kopuru. Unfortunately, all of John Black's collection was destroyed by fire. Gilbert Mair knew Aukaha and Tuhi around Lakes

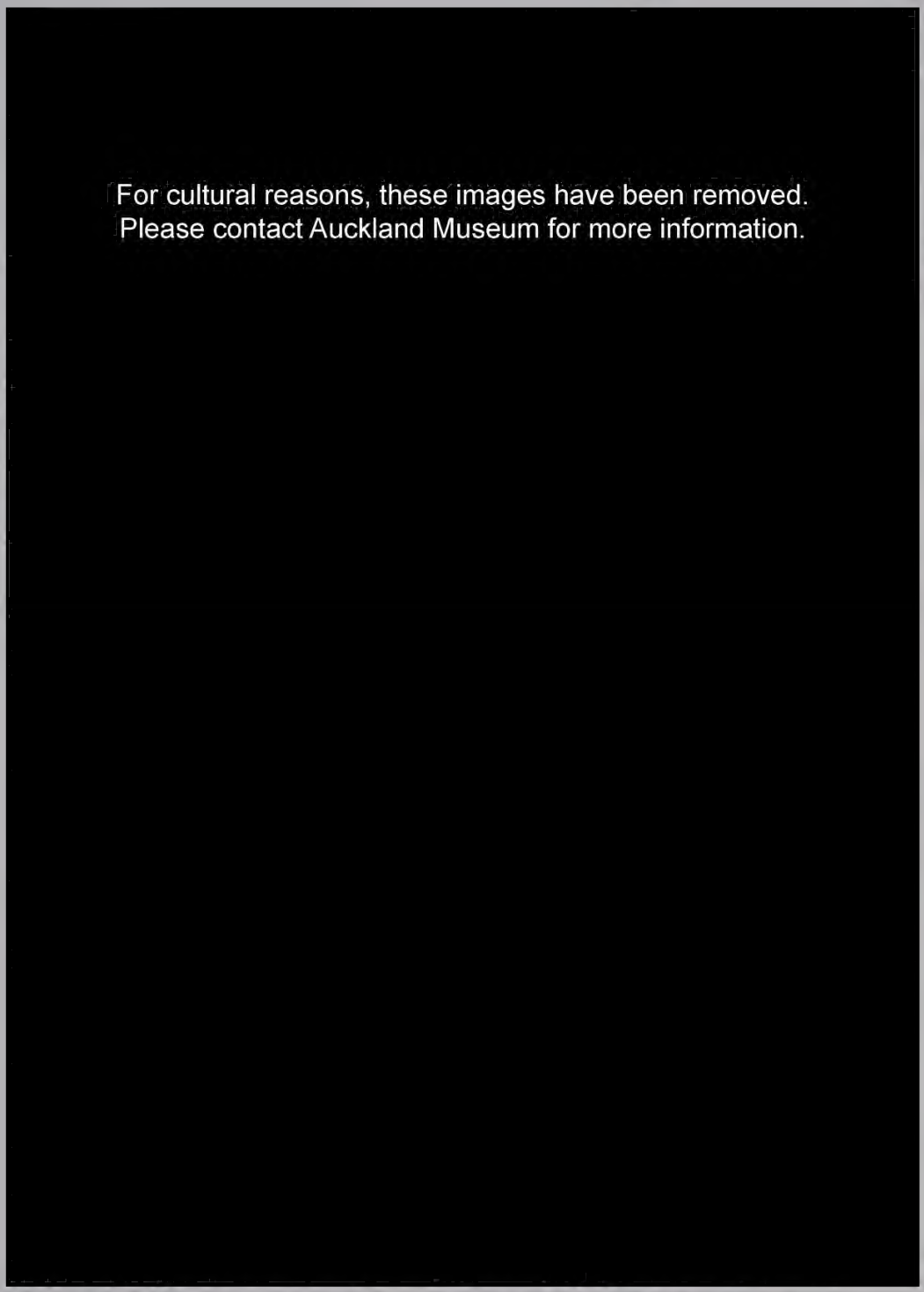


Figs. 93-96. Figure-supported bowls. 93. Carved by Anaha Te Rahui. 94. Attributed to Wero. Photo: Otago Museum. 95. Carved by Aukaha Wharepouri. 96. Carved by Patoromu Tamatea.

Rotoiti and Okataina in the 1880s. In April 1885, Gilbert Mair travelled the length of Okataina from south to north and met Aukaha and Tuhi at Tauranganui where the track from Ruato on Lake Rotoiti emerged from the Waione bush. The next day Aukaha returned to Ruato where he was living, while Tuhi continued on to Te Wairoa, returning back to Ruato four days later (Mair, Ms 92, Diary 35, Alexander Turnbull Library). Aukaha was apparently one of that loose group of carvers centred on Ruato in the later part of the nineteenth century, producing small items for sale to passing tourists as well as other objects for tribal purposes.

Fortunately, one documented carving by Aukaha has survived. This is a fine large ornate kumete (Fig. 95) now held by his great grand-daughter in Dargaville. Once in John Black's collection at Te Kopuru, this kumete somehow escaped destruction in the fire. Measuring 48 cm long, 15.2 cm wide and 30 cm high with the lid on, this kumete has a squatting support figure 23 cm high at each end. The lid has two koruru type faces and a different form of koruru face appears on each side of the bowl. Most of the surface decoration is whakarare and pointed oval sections of rauponga. At first sight, Aukaha's carving style appears very similar to Jacob Heberley's, especially in the use of pointed oval rauponga sections around mouth and eyes. Aukaha also displays a sure control of his medium that is reminiscent of Jacob's skill. However, on closer examination, important differences in style emerge between Jacob and Aukaha. The composition of the supporting figures is very different, with Aukaha favouring more stylised form. Aukaha's surface decoration is much larger in proportion to the total work as compared to the very fine miniaturised detail preferred by Jacob. Although Jacob and Aukaha were working over the same period, there is no evidence either in their life histories or in the form of their art that they ever met or shared ideas.

One of the most prolific carvers working around Rotorua at this time was Patoromu Tamatea whose exact tribal affiliations within Te Arawa are uncertain, although he is usually considered to be of Ngati Pikiao. He apparently lived at Ohinemutu where Morton met him in about 1872 while the carvings for Tamatekapua meeting house were being completed. Morton (1961:49) noted, "We met a very remarkable looking Maori, a hunchback, who was said to be the best craftsman at this kind of work in New Zealand". In a very fanciful account of the carving of a Maori-style Madonna and Child, Cowan (1934) also describes Patoromu as a hunchback, living at Ohinemutu in the 1870s, after service in the Armed Constabulary against Te Kooti. Cowan tells of Patoromu as a dedicated artist, carrying his work with him through the bush campaigns, then settling at Ohinemutu to produce models, replicas and house carvings. According to Cowan, Patoromu was also a tattooist, providing women with their traditional chin patterns. When a new Roman Catholic church was constructed at Ohinemutu in the later 1870s, Patoromu carved a Madonna and Child for the altar which the priest reluctantly rejected. Mortified, Patoromu defected from Catholicism although he kept the carving for the rest of his life. On his deathbed he gave his carving to his old commander and friend, almost certainly Gilbert Mair. Presumably, this is the Madonna and Child carving now in the Gilbert Mair Collection in Auckland Museum (AIM 22), although Mair himself recorded that the carving was made in 1845 and makes no mention of Patoromu as the carver (Roach 1972). Gilbert Mair did know Patoromu as a carver, even having commissioned a carved bowl from him at Taheke, sometime in the 1880s (Mair, MS 92, Diary 25, 36, Alexander Turnbull Library).



Figs. 97-100. Items carved by Patoromu Tamatea. 97. Whalebone kotiate. 98. Whalebone patuki. 99. Wooden walking stick. 100. Figure-supported box. Auckland Museum.

Auckland Museum holds many small items documented as carved by Patoromu Tamatea, including a mouth piece for a gourd carved in about 1868 (AIM 6145), four tobacco jars specially carved for Captain Northcroft (AIM 6146-6149), and a very large ornate figure-supported bowl (AIM 117) said to have been intended as a gift for Sir George Grey but eventually given to Gilbert Mair in the 1870s (Fig. 96). Other items documented or clearly attributable to Patoromu are pipes, bone combs, a bone patuki, wooden clubs, various kumete and rectangular figure-supported boxes, walking sticks and paddles (Figs. 97-100). In addition to these smaller items, Auckland Museum holds a tekoteko (AIM 200.2) attributable to Patoromu, while the National Museum has a full-sized ridgepole end, 3 m long, carved with three high-relief figures in Patoromu's unmistakeable style (ME.15321). These two large house carvings indicate that Patoromu was also involved in architectural projects. His work is basically Arawa in style but there are some idiosyncratic touches that almost serve as his trademark. At fairly regular intervals in a series of pakati notches, he leaves a short section of plain ridge. In areas of whakarare, he creates a continuous sinuous S-shaped pattern of plain haehae grooves. These two features are unique to his individual style. Patoromu's small neat stylised and naturalistic figures with their delicate rings of paua shell eye inlays do appear to be very similar to Jacob's even down to the occasional use of a bulbous tongue. However, on closer comparison, their stylistic differences become clear and it seems that these similarities are only coincidental.

These similarities between the work of Jacob and the Rotorua carvers described above, both in terms of details of motifs and in overall form of particular innovative items such as the figure-supported bowls, have given cause to wonder whether there had been any actual contact between them. There is no evidence that Jacob ever went to Rotorua, especially during the early formative years of his carving career. If the early 1869 date for Jacob's large kumete (Catalogue number 1) carved at Petone is correct, then it seems that Jacob may have been equally as responsible as the Rotorua carvers for this innovation of this new type of kumete. With no other Te Ati Awa carvers in Wellington making kumete like this, Jacob may have picked up the idea from Rotorua and then developed it according to his own genius. Early bowls with figure supports are known from the East Coast and Wanganui areas, from which Jacob may also have gathered ideas for his compositions.

With regard to this apparent Rotorua element in Jacob's carving style, the carver and art historian, J.M. McEwen has commented:

> "I have always considered Jacob to be a product of the Anaha school and I find it hard to see anything of Te Ati Awa in his work. His pakati are pretty much the same as Arawa, while Te Ati Awa had an astonishing range.
>
> The double-tongued koruru head simply shrieks Arawa to me. The pakura edge on the lid also looks like Arawa. I find it hard to believe that Jacob didn't get next to Anaha or his relations at some early period."
>
> (J.M. McEwen, pers. comm. 11 Nov. 1990)

Jacob's surface patterns certainly show some close similarities to those developed at Rotorua and systematised in the later years of the nineteenth century, as exemplified in the samples carved by Anaha Te Rahui for Augustus Hamilton (Mead 1986). In particular, Jacob's surface decoration patterns of rauponga and whakarare, his takarangi spirals, his piko-o-Rauru spirals, and his figure types of koruru, ruru and

wheku are quite close to Anaha's. However, Jacob's manaia faces and figures and his naturalistic figures are very different from the Arawa types. In the absence of any evidence suggesting a direct connection between Jacob and the Rotorua carvers, one can only assume that these similarities are convergencies resulting from Jacob's own efforts to develop a culturally correct and acceptable style.

The assumption that Jacob had to develop his own style is perhaps supported by the limitations and idiosyncracies of his kowhaiwhai patterns. Virtually all of his kowhaiwhai is the same simple pitau series design, replicated in an infinite linear direction by projecting one of the arms of a branching koru scroll. Kowhaiwhai design number 26 (Hamilton 1896) collected by H.W. Williams where it is called ngutukura is constructed on the same principle but Jacob's pattern had fewer minor koru branches. Jacob often embellished his kowhaiwhai pattern with a form of embattled infilling which followed the curve of the koru bulbs. This kowhaiwhai pattern was clearly a favourite with Jacob who probably used low-relief kowhaiwhai patterns more widely than any other carver of his time. Only rarely did Jacob vary his standard kowhaiwhai pattern, as on the two paddles (Catalogue numbers 41, 42) where he introduced a pitau series design radiating from a central point.

CARVERS FOLLOWING JACOB

Although Jacob was not carving within the context of a communal carving school where young apprentices are an integral part of the group, he did teach some members of his immediate family to carve. Consequently for a short time, carvings in the style of Jacob Heberley were being produced by a small number of dispersed carvers who never constituted a school in the full sense. With one or two exceptions, this second generation did not teach any other carvers, so that very soon Jacob's style ceased as an active tradition of carving.

The most famous pupil of Jacob was his nephew Thomas Henry Heberley (Fig. 101), the son of Jacob's brother Joseph. Thomas was born at Picton in 1876 where his father was harbourmaster. His mother died on 23 June 1883 and his father on 12 June 1889. Therefore, Thomas as a young boy of 13, and his brother Herbert, came to live with their uncle Jacob in Petone. They both soon learnt the art of Maori carving from Jacob. Thomas was apprenticed as a painter and paperhanger but he continued to carve for occasional commissions and other family purposes, until his skill brought him to the notice of W.J. Phillipps, the Ethnologist at the Dominion Museum, Wellington. For the last ten years of his life, from 4 June 1926, Thomas was employed by the Dominion Museum working at first in the old museum building near Parliament, and in a large shed nearby, then in the new building at Buckle Street, refurbishing and restoring many items in the collections in preparation for the opening of the new displays. This work had only been recently completed when Thomas died at his home in Petone on 15 January 1937 (*Evening Post*, 15 January 1937).

Thomas produced many carvings during his later life, with many of these still held in the National Museum, Wellington. On the restored meeting house Te Hau-ki-Turanga in the museum, Thomas carved the maihi, the koruru, the door pare, the window frame, and did the repainting of the original kowhaiwhai patterns. Apart from the original front of the museum's storehouse named Te Takinga, all of the carvings on the sides and rear were Thomas's work. The reconstructed war canoe in the museum, Teremoe, bears Thomas's carvings along the rauawa. He also carved the

Fig. 101. Thomas Heberley at work on the prow of the canoe now in Canterbury Museum. Photo: Alexander Turnbull Library.

prow and sidestrakes for Te Heke Rangatira canoe, now in Canterbury Museum. Other work undertaken by Thomas included restoration on the Otaki Maori Church, the casket to contain the ashes of Sir Maui Pomare, a carved table presented by the New Zealand Government as a wedding gift to the Duke of Gloucester, a carved chair presented to the Welsh Eisteddfod and a carved chair presented to Lord Bledisloe at Picton for the Waitangi Treaty House. As a museum staff member, Thomas was also involved in the transfer back to the museum in Wellington of the original frontal carvings from Te Whai-a-te-Motu meeting house at Ruatahuna and ancient stone-tooled carvings found in the swamps of Waitara. Unfortunately, a major obituary on Thomas (*Weekly News,*27 January 1937) contains some confusion between him and Jacob.

In his private life, Thomas produced a wide range of smaller carvings, including paddles, walking sticks, tables, lampstands, and wakahuia. His family remember him as a compulsive carver around his own home, carving household furniture such as tea trolleys and lampstands. Nothing was safe from his chisel and mallet, not even the door frames of his rented house nor his daughter's new tennis racquet (Mrs Wright, pers. comm. 13 December 1990). Family members believe that Thomas worked on carvings for the Waitara meeting house and he is also said to have painted the kowhaiwhai in Te Tatau-o-Te Po meeting house at Petone.

In style, the work of Thomas is readily distinguished from that of Jacob. In the finer details of their work, Thomas did not display the meticulous attention to neatness and finish that characterised the work of Jacob. Nor did Thomas manage the sureness of line and curve that Jacob produced with his chisel. Both Jacob and Thomas were chisel carvers with no traditional training in the use of the long-handled

Fig. 102. Herbert Joseph Heberley. Photo: Courtesy of Eric Thomas, Tauranga.

adze. As such, their larger works suffer from a lack of those free-flowing curves and strong lines that can only be achieved by a master adze carver. Thomas was aware of this deficiency in his training which caused him particular chagrin when Pine Taiapa and the other students of the Rotorua Carving School arrived at the Dominion Museum in 1936 to work on Te Hau-ki-Turanga and to carve some of the poupou for the Waitara meeting house, fresh from their training in the use of the long-handled adze under the master-carver Eramiha Kapua of Ngati Tarawhai (J.M. McEwen, pers. comm. 11 November 1990; C.I. Tuarau, pers. comm. 1973).

Perhaps as a result of his museum employment and the consequent need to reproduce various styles, much of Thomas's later work is stilted and rather disjointed. Despite these limitations, Thomas did do some outstanding copy work, most notably the prow now on the war canoe in Canterbury Museum which is modelled on a Ngati Tarawhai prow in Berlin Museum, and the maihi of Te Hau-ki-Turanga which are based on the maihi carved by Natanahira Te Keteiwi for the original Te Poho-o-Rawiri house at Gisborne.

Jacob also taught carving to another son of his brother Joseph. This was Herbert Joseph Heberley (Fig. 102), a younger brother of Thomas. Herbert was born at Nelson on 7 October 1877. On the death of his father in June 1889, Herbert went with Thomas to live with their uncle Jacob and his family in Petone. There he also learnt Maori carving from Jacob. By 1896, Herbert was living in Nelson where he was a member of the Young Persons Scripture Union. At the age of 23 or 24, Herbert left New Zealand to serve as a corporal in the Railway Pioneer Regiment at the Boer War for 14 months between 1900 and 1902. By 1908 Herbert was living in Auckland and sometime in 1909 at about the age of 32 he married Ngatirata at Rotorua, according to Maori custom. They lived at Rotorua where Herbert did casual work for the Tourist Department. On the 25 January 1911 he was killed by an earth fall while working on the Waimangu track (Eric Thomas, pers. comm. 26 May 1989, 9 December 1990).

Only one definitely known carving by Herbert has survived, a walking stick now held by a descendant in Tauranga. This tokotoko (Fig. 103, 104) is 93 cm long and follows very closely on the standard walking stick pattern established by Jacob. It is clearly the work of a very accomplished carver and can be distinguished from the work of Jacob by a greater use of paua shell inlays including a heart-shaped one and more elaborate surface patterning. The nose of the figure is flatter and not as well-formed as those carved by Jacob although it is reminiscent of the flat nose outlined by Jacob on his reproductions of the Dresden paddle. Herbert is said to have carved another similar walking stick which was presented to the Duke and Duchess of Cornwall and York at Rotorua in 1901 but subsequent enquiries by Eric Thomas have not been able to identify this tokotoko among the Royal collections. Another walking stick held by a descendant of Jacob living in Auckland may also be the work of Herbert, judging by the style (Fig. 105, 106). It is distinguished by very fine elaborate attention to detail and the addition of new motifs including figures derived from hei-tiki and naturalistic lizards. Family traditions also suggest that Herbert may have carved picture frames, tables and trays. Rua Allport of Te Puke and Tauranga who was Herbert's brother-in-law was inspired to carve walking sticks and other items to the basic Jacob Heberley pattern but he did not achieve the high level of technique displayed by Herbert.

Apart from these smaller carvings, Herbert is important in the sequence of the Heberley carving tradition for his production of a carved meeting house, thereby

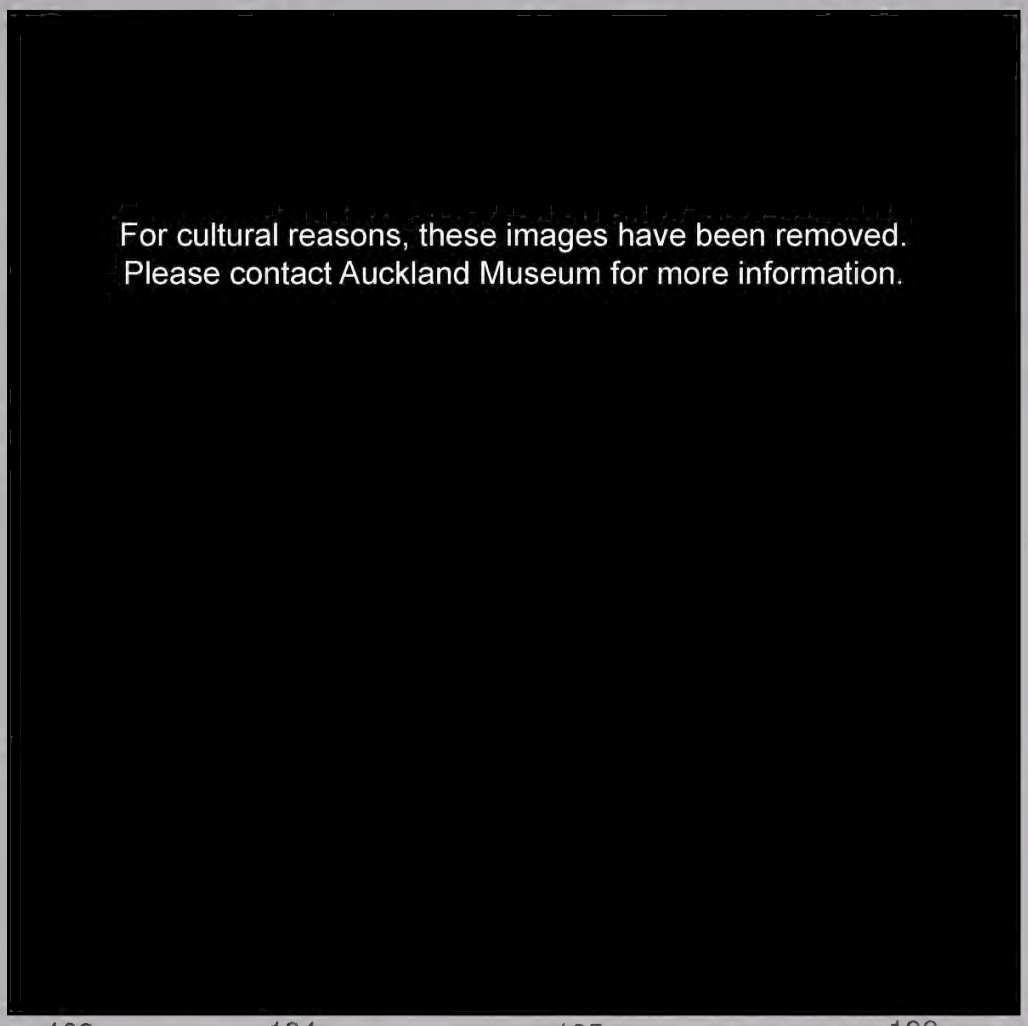


Fig. 103-106. Walking sticks. 103, 104. Carved by Herbert Heberley. 105, 106. Attributed to Herbert Heberley.

bringing the tradition back to a community-oriented art after its commercially-oriented focus on an external market developed by Jacob. Thomas Heberley painted the kowhaiwhai patterns in Te Tatau-o-Te Po meeting house at Petone, but Herbert is apparently the only Heberley carver to have been responsible for a communal carved meeting house. This was the meeting house (Fig. 107) at Riverhead, just north of Auckland, built in 1909 by the Ngati Whatua people of the Marae-o-Hine village, a modern settlement with a small population of less than 150. According to Madden's (1966:22) history of Riverhead, this meeting house was:

> "largely carved by Bert Eberley [sic] of the Ngatiawa (Nelson), assisted by Tu Hapi and Wiripo Pita. Opened by the tohunga Tumia of the Waikato on the 23 April, 1909, great emphasis was placed upon ancient carvings which graced the interior."

Judging by the early photographs of this house with its name 'Whatu Tamainupo' inscribed above the central doorway, all of the frontal carvings are the work of Herbert and clearly show their derivation from the idiosyncratic style established by Jacob Heberley at the other end of the North Island. Herbert's involvement in the carving of this house is confirmed in a letter that he wrote to his sister on 5 November 1908 from Auckland where he was apparently working for a jewellery firm (letter held by family, Tauranga). Herbert commented to his sister that "I was going out again last Sunday but I had to go to Riverhead to make arrangements for putting up a house". Nothing now remains of the Riverhead meeting house and Herbert's tragic death at such an early age precluded any subsequent development of the Heberley carving style in the Rotorua area.

As a sign of the changing times, it is also significant that Jacob taught his daughter to carve, a development that would not have been approved in the old tribal world. Jacob's daughter Myrtle, also known as Muki, was slightly handicapped and according to family oral tradition, Jacob taught her to carve. It is said that Myrtle actually carved the fence of her home in Petone (Mrs Miriam Heberley, pers. comm. 6 March 1990). One of Myrtle's carvings has been published, a picture frame around a portrait in Steedman (n.d.) with the caption "Frame carved by Muki Heberley". In the Auckland Museum photographic collections, several carvings held by Heberley

Fig. 107. Whatu Tamainupo meeting house at Marae-o-Hine, Riverhead, Auckland. The man standing at centre is probably Herbert Heberley. Photo: Price Collection, Alexander Turnbull Library.

descendants are said to be the work of Myrtle (Negative numbers C4036-45). Among these, the items most probably carved by Myrtle are two free-standing figures, a carved treasure box, a carved frame and even a carved tennis racquet. Myrtle died at the early age of 29, leaving a husband and two children.

Some elements of Jacob's carving style were carried on into a third generation by Ivor Te Puni of Picton who was taught to carve by Thomas or perhaps Jacob Heberley. Ivor is said to have used Jacob's template for his walking sticks. Certainly, a walking stick carved by Ivor Te Puni (Fig. 108) and now in the Island Love collection at Picton is a very close copy of Jacob's standard walking stick composition although the carving technique is not as accomplished as Jacob's. However, a carved bowl (Fig. 109) with a reclining figure on the lid carved by Ivor and now in the Love Collection bears little resemblence to Jacob's style. In his time, Ivor Te Puni was the only practising South Island Maori carver and occasionally he was asked to produce presentation pieces to represent the South Island.

With the passing of Herbert and Thomas Heberley and Ivor Te Puni, the carving style begun by Jacob Heberley came to an end as a continuous tradition. However, many of his carvings remained in private hands and museums where they could serve as inspiration to later beginners. One such later beginner was Wilf Fink, an Englishman who came to New Zealand in 1920. Fink began to teach himself Maori carving in 1934 by studying the collections in the Dominion Museum (*Evening Post*,

Figs. 108, 109. Carvings by Ivor Te Puni. 108. Walking stick. 109 Bowl.

22 April 1978). He may have known Thomas Heberley at the museum but he certainly saw some of Jacob's walking sticks, as evidenced by the similarity of Fink's carved walking sticks (Fig. 110). Fink later taught Cliff Curtis, another Pakeha, who went on to produce many carvings for the New Zealand Government Tourist Department to use in their promotional campaigns. For the last few years of his working life, Curtis was employed at the National Museum, producing replicas of carvings in the collections for use in educational displays and as handling material.

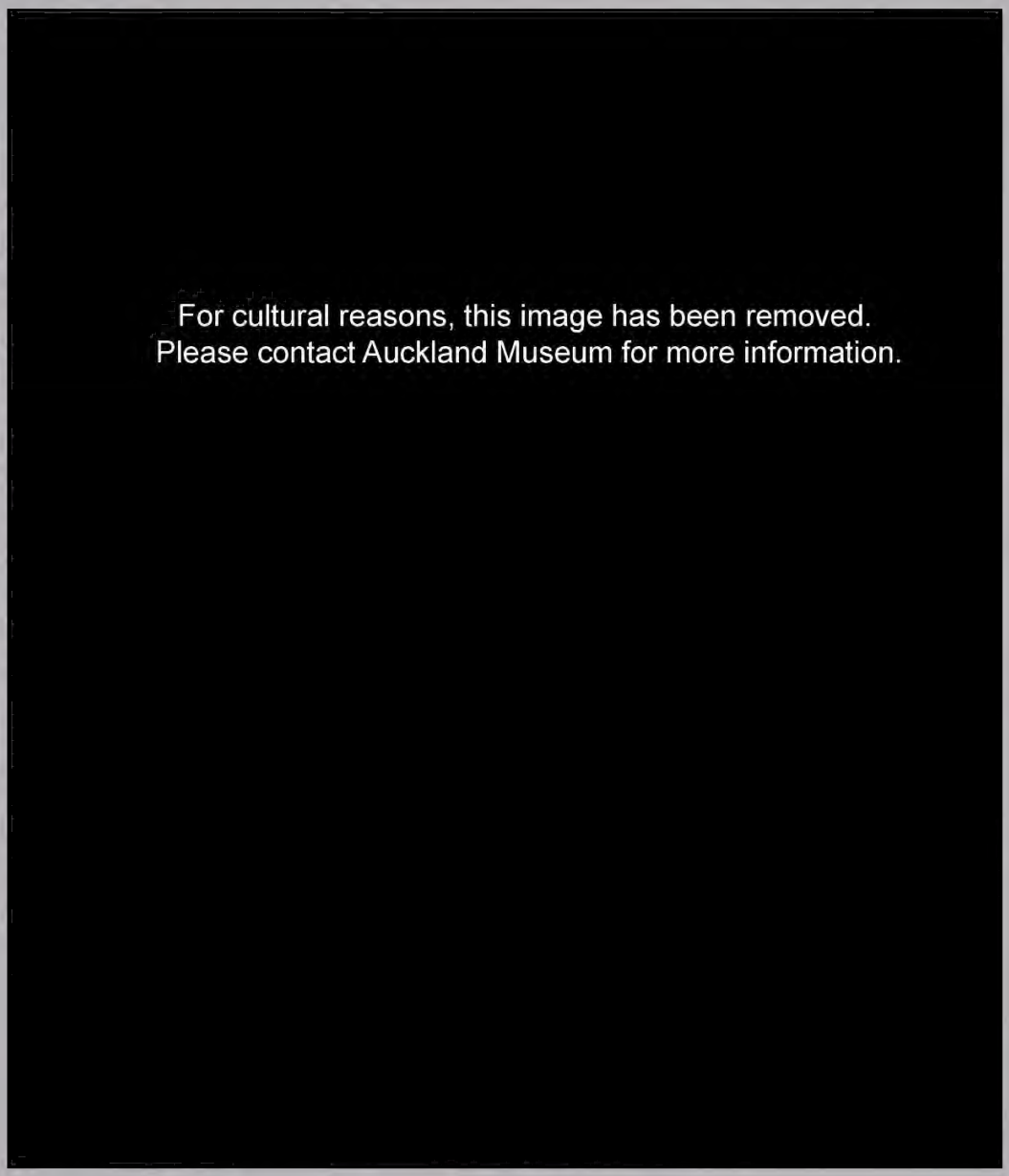


Fig. 110. Wilf Fink with two of his carved walking sticks. Photo: *Evening Post*, Wellington.

CONCLUSION

The world in which Jacob Heberley pursued his carving career was greatly changed from the old pre-European Maori world of Queen Charlotte Sound and Wellington. Just how changed becomes apparent when Jacob's repertoire and his patronage is considered. All of Jacob's carvings were non-functional replicas and models made purely for their appearance and to fulfil a symbolic purpose only. His weapons were never made to harm anybody and in fact were so weak structurally that several are now damaged from normal handling. His figures were almost never intended to represent particular tribal ancestors and they never served to define the tribal identity of their owners. The types of items that Jacob chose to produce were determined by his paying customers and by impersonal market forces, rather than by the needs of any tribal community.

On the whole, the products of Jacob's skill fulfilled their primary purpose within the dominant European society and most of his patrons were members of that society. It is true that some of his carvings were held by Maori families and individuals but whether this occurred by design or chance is not clear. There is no evidence of Jacob working directly for Maori clients but it would have been in the nature of any such transaction that no documentary evidence would have been generated. Certainly, Jacob's name is not associated with any major tribal carving projects. Nor is there any record of Jacob undertaking specific commissions for European visitors or producing objects in large numbers for sale to anonymous tourists. Jacob's reputation seems to rest almost entirely on his production of specific items for special commissions within the sphere of upper-class Wellington European society.

Jacob's life and work can be viewed in various historical contexts and indeed it is these contexts which now define his work and determine how present-day viewers may assess it.

Within the context of the Heberley family and their wide-spread descendants, the memory of Jacob and those of his known carvings provide a focus for family identity and a strong visual link to their Maori ancestry.

Beyond the Heberley family context and into the wider tribal Te Ati Awa context, Jacob is not well-known as a carver. With no large tribal projects associated with his name, Jacob is not recognised as a major Te Ati Awa carver. It is true that some of his works have been accepted and remembered as tribal heirlooms among Ngati Kahungunu, Ngati Toa, Te Ati Awa, even Tuhoe and perhaps others, but it is also probably significant that in all these cases, the name of the carver has not been remembered in association with the artefacts. From this tribal perspective, Jacob's work could even perhaps be viewed as the last expression or the last gasp of Te Ati Awa tribal carving, until its artificial resurrection under Sir Apirana Ngata and the Rotorua School of Maori Arts and Crafts in 1928. The personal tradition begun by Jacob did not lead to a new viable tribal tradition and when Ngata sought to revive Te Ati Awa carving style he looked much further back, to classical northern Taranaki style.

It is in the historical context of New Zealand as a developing nation striving to find a distinctive identity that Jacob's carving fulfilled its most significant role. However, in order to fulfil this role, Jacob's art had to sacrifice much of its Maori character and had to allow itself to be appropriated into the European world as a tame model of Maori culture. Jacob's carvings were all tidy and neat non-functional models and replicas, non-threatening to a European government anxious to maintain control of the racial situation in New Zealand. Being a part-Maori person living at a fixed address near at hand to the centre of government and without a powerful tribal community to be negotiated, Jacob could be relied on to produce 'Maori art' that was easily arranged and easily controlled. For this purpose, it was of no concern to which tribe Jacob belonged. This contrasted with the situation in Rotorua and other areas of the country where the supply of suitable Maori symbols was controlled by a strong tribal community in which the artists lived and worked.

This European appropriation of Jacob's art reached its highest level with the royal tour of the Duke and Duchess of Cornwall and York. Already during the preparations for the tour, the government had had problems with the Waikato tribes who wanted to stage their own welcome to the royal party, including a canoe regatta on Auckland Harbour (Bassett 1987:127). However, the government firmly refused to allow this exercise of Maori control of a Maori occasion, and the official Maori welcome was confined to Rotorua where government control could be more strongly applied. But so long as there was no question of who was in control, Maori welcomes and affectations of Maori speech and dress by politicians and officials and even by the Duke and Duchess themselves became an accepted part of royal tour behaviour. The prominence accorded to Jacob's carvings as royal gifts during this tour and soon afterwards at King Edward's Coronation can be interpreted as an aspect of this use of tamed Maori culture in defining a New Zealand identity. Just how powerful this appropriation was, becomes apparent when it is realised that on nearly all the occasions when Jacob's work was presented to royalty by Pakeha politicians no Maori people were present, except for Sir James Carroll.

Bassett (1987:135) has argued that this 1901 royal tour marked the early stages of a developing self-image for New Zealand, one of progress and efficiency in which the Maori had a shared place so long as they were prepared to accept European ideals. In this climate, Jacob's carvings filled an obvious need very successfully, serving as safe, non-threatening symbols of a Maori culture tailored and sanitized to suit the new world of progress. For the period of the 1890s leading up to this tour, Phillips (1983:525) has asked whether any indigenous traditions were spawned in New Zealand during that time. He finds one affirmative answer in the way that certain aspects of Maori culture and mythology were appropriated to support the birth of a typically New Zealand culture and literature. Pakeha New Zealanders were prepared to accept these aspects of Maori culture by the 1890s because the Maori themselves were no longer perceived as a threat. Furthermore, the Maori who figured in this nationalistic vision of 'old Maoriland' was a mythical 'old-time Maori' with decidedly Anglo-Saxon qualities. In this way, Maori culture provided a perfect mythology for a 'Britain of the South'. Phillips (1983:534) goes on to point out that only those elements of Maori culture which fitted existing Pakeha ideals were acceptable, citing the fact that

Pakeha did not accept Maori styles of carving. However, as the case of Jacob Heberley shows, Pakeha of the time did take the intermediate step of employing a Maori carver to supply them with culturally acceptable items for symbolic purposes within the dominant Pakeha culture.

Therefore, the greatest significance of Jacob's work may be found in the success with which it fulfilled these roles, thereby helping to open up the commercial field for other later carvers. Maori carvings became the appropriate gift or decoration for all sorts of situations, in the political and sporting and cultural scenes, at all levels from the most international to the most local. Perhaps it was the success of Jacob's art in official government circles that in some small way may have predisposed Pakeha politicians to support Sir Apirana Ngata in the passing of the parliamentary act setting up the Rotorua School of Maori Arts and Crafts in 1926, just twenty years after Jacob's death.

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FURTHER ARCHAEOLOGICAL INVESTIGATIONS AT THE SETTLEMENT OF WAIWHAU, HAURAKI PLAINS

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Abstract. A University of Auckland Department of Anthropology archaeological field school carried out excavations at the site of Waiwhau in 1987 and again in 1988. These provided a site stratigraphy, and evidence of three main settlement phases: undefended, defended and undefended, followed by the use of the site as a burial ground. The emphasis was on dispersed settlement and temporary defensive measures, in contrast to the neighbouring densely occupied site at Raupa. Historic sources support an early protohistoric date for Waiwhau. Details from these sources correlate well with excavation findings.

The site of Waiwhau, T13/756 (N53/198), and the neighbouring site of Raupa, T13/13 (N53/37), occupy opposite sides of the Waihou River at its junction with the Ohinemuri, on the east side of the Hauraki Plains, at Paeroa.

Waiwhau and Raupa were originally investigated because flood protection work by the Hauraki Catchment Board threatened their destruction. After a preliminary excavation of both sites by Phillips in 1984 (Phillips 1986), it was decided that areal excavations were required to better understand and interpret their history. As a result, Waiwhau was subsequently excavated by the University of Auckland's field school in 1987 (Phillips 1988), when Nigel Prickett, Auckland Institute and Museum, began excavations on Raupa (Prickett 1990).

In February 1988 ten students led by Professor R. C. Green with the assistance of Rod Wallace, Liz Hudson and Caroline Phillips, all of Auckland University, undertook a second excavation at Waiwhau. Over the same period, Nigel Prickett directed further investigations at Raupa. As in the previous year the two excavations shared facilities and stayed at the Ngati Tamatera Te Pai-o-Hauraki marae, at Paeroa.

In New Zealand archaeology there was a period when attempts were made to integrate oral history of various Maori groups with the archaeological record (e.g. Duff 1956:18-20, Fig. 1). Usually these were conceived on a grand, or New Zealand-wide, scale. For the most part such studies have not proved very effective, and after criticism by Golson (1960) such broad-ranging interpretations have only occasionally been attempted (Groube 1970:153-55; Simmons 1969:6-8), again with little convincing success. However, individual sites, especially those dating to the late prehistoric or protohistoric periods, are often referred to in traditional histories, and if

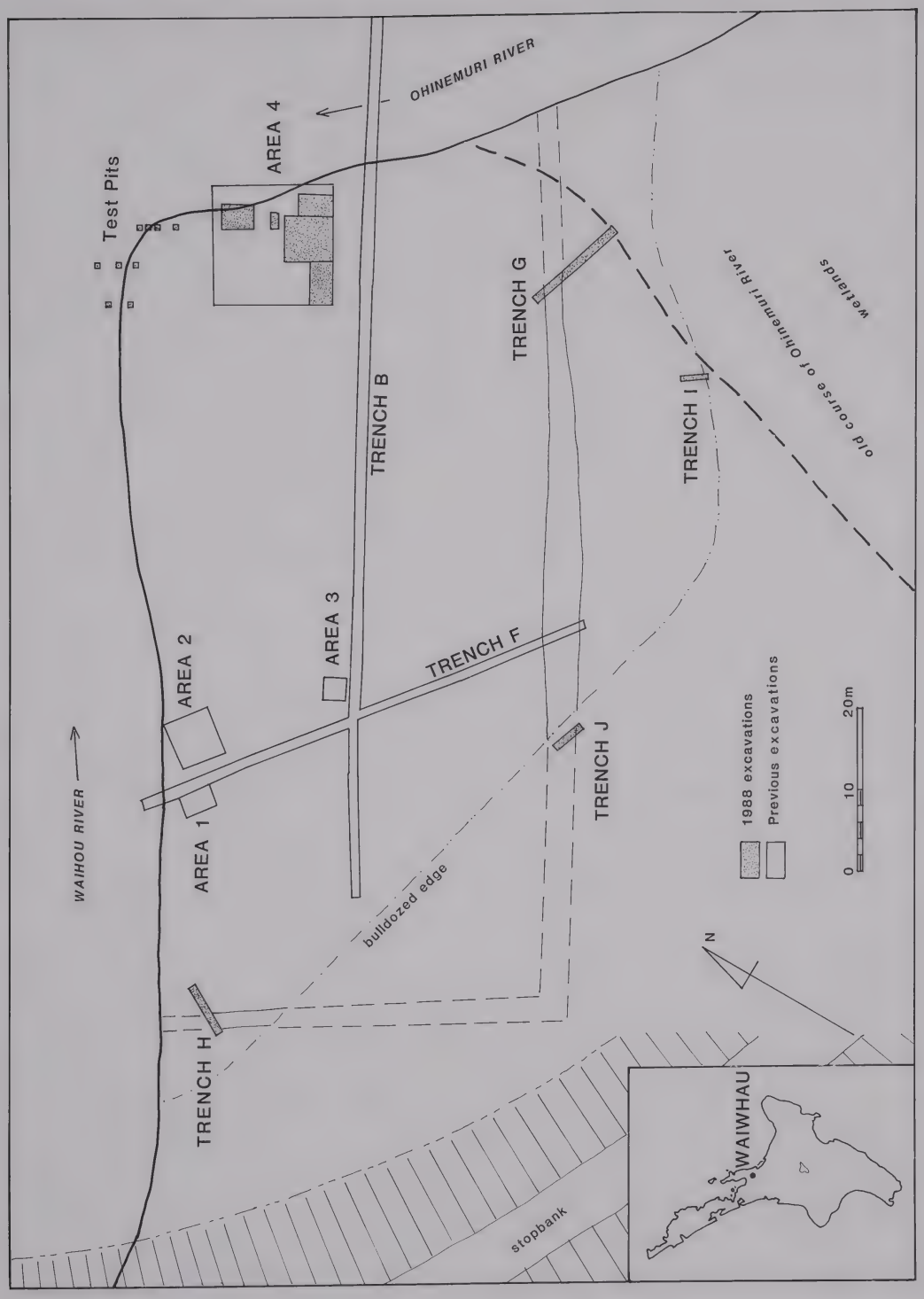


Fig. 1. Location of excavations at Waiwhau.

archaeological and traditional evidence are ever to be effectively integrated, it will be at this local level. Waiwhau, which is a protohistoric site, has proved suitable for the successful integration of these two kinds of evidence.

Several reasons existed for continuing the excavation programme at Waiwhau. Firstly, it provided a contrast to the intensely occupied and defended neighbouring site of Raupa. Moreover, as work was to continue at Raupa in 1988, investigation of Waiwhau could readily be carried out at the same time. This would help in the interpretation of both sites, as it was thought highly probable that at some periods occupation at the two sites was contemporary. Secondly, it was thought that further investigation would provide information on the rather obscure transition between the late prehistoric and early historic periods, shedding light on a time when European influence presumably had its greatest impact on Maori society. Thirdly, Waiwhau was well suited for a field school, because of its relatively straightforward stratigraphy. This consisted of a white base clay, dark occupation material in a variety of layers and lenses, and an overlay of bright yellow rock flour (derived from gold mining tailings). Lastly, additional excavation on the site in conjunction with documentary research would, it was hoped, shed light on the defences and the type of occupation in the early period of European contact.

THE EXCAVATION

The previous excavations of Areas 1, 2 and 3, during 1984 and 1987, had given some idea of the distribution and nature of occupation that existed on the site. The only place where there appeared to have been intense activity was at the eastern end of Trench B, near the original junction of the two rivers. This portion of the site was also physically lower, so that the stratigraphy had been less disturbed by subsequent ploughing. For these reasons, it was thought that this area would give new information concerning occupation at the site.

Area 4 was therefore laid out adjacent to Trench B (Fig. 1). Previous work (Phillips 1988) had suggested that the defences were insubstantial. Three trenches were opened up across the ditch to test this conclusion and to define the extent of the defended area. One of these trenches was placed where the ground sloped down the river banks and into wetlands at the site margins, to investigate the environment that existed when Waiwhau was occupied. Another trench was placed beyond the presumed limits of the ploughed paddock to study undisturbed cultural layers or the natural soil profile. Test pits were excavated to the north of Area 4 to determine the river bank edge of the site (Fig. 1).

All portable artefacts, as well as samples of midden, charcoal and soils, were removed for further analysis (Appendices 1-3).

AREA 4

The evidence of relatively intense occupation at the east end of Trench B consisted of several postholes, and layers of charcoal and shell midden, in a thicker deposit than had been encountered elsewhere on the site. Thus Area 4 was selected for areal excavation, specifically to uncover evidence of occupation and possible defence. The

deeper deposits should enable the development of a site chronology, and the location of the excavation would reveal the relationship of the site to the two rivers at their junction.

An area approximately 15 x 15 m was scraped by machine north of Trench B, to take off the overlying rock flour and most of the ploughed zone. The entire area was covered with scattered midden, and strips of midden and rock flour could be seen corresponding to the ploughing lands encountered previously at the western end of the site (Phillips 1988:66, Fig. 11). The surface underneath the disturbed zone revealed three areas of different character: to the north-east was an area containing deeper rock flour; to the south-west was an area of particularly dense midden and fire-cracked cooking stones; and to the south-east was an area of darker soil but less midden. Excavations designed to sample these three areas were laid out and uncovered by hand.

The resulting excavations revealed up to eight phases of occupation. These phases occurred before the episodes, which had been recorded over the entire site, of flooding (depositing rock flour), ploughing, further flooding and topsoil development.

Area 4i

To the south-east a 6 x 6 m square was opened up adjacent to postholes seen in Trench B. The eastern 3 m was not fully excavated when testing showed it to drop very steeply to the Ohinemuri River. The square was later extended 2.5 m to connect with Area 4ii.

Phases 1-3. In this square, the original occupation surface had been formed by clearing the topsoil and subsoil and exposing the underlying base clay in which the early features could be seen. For this reason the number of phases and the original depth and association of features could not be determined with certainty. There were a great many post and stakeholes in the centre and east side of the square from which a few alignments could be identified.

At least three early construction phases can be defined. The first features (Fig. 2) included a bin pit 1.3 x 0.6 m, 180 mm deep; two drains or bedding trenches 120 mm wide, 100 mm deep, which flowed at a gradient measured between 1° and 2° from the north-west to south-east; a small hollow, 300 x 250 mm, 260 mm deep; and three possible posthole alignments which may have related to a house.

The second phase (Fig. 2) included a drain, 250 mm wide and up to 150 mm deep, which flowed down from Area 4ii eastwards towards the Ohinemuri River at a slope of 3°. A shallower side drain joined this from the north.

The third phase included the deepening of the early drain by about 50 mm (Fig. 3). Two postholes, aligned with another pair in Area 4ii, may have formed part of a structure associated with the drains. Three other postholes (500-700 mm deep), may possibly have belonged to a pataka (above ground store).

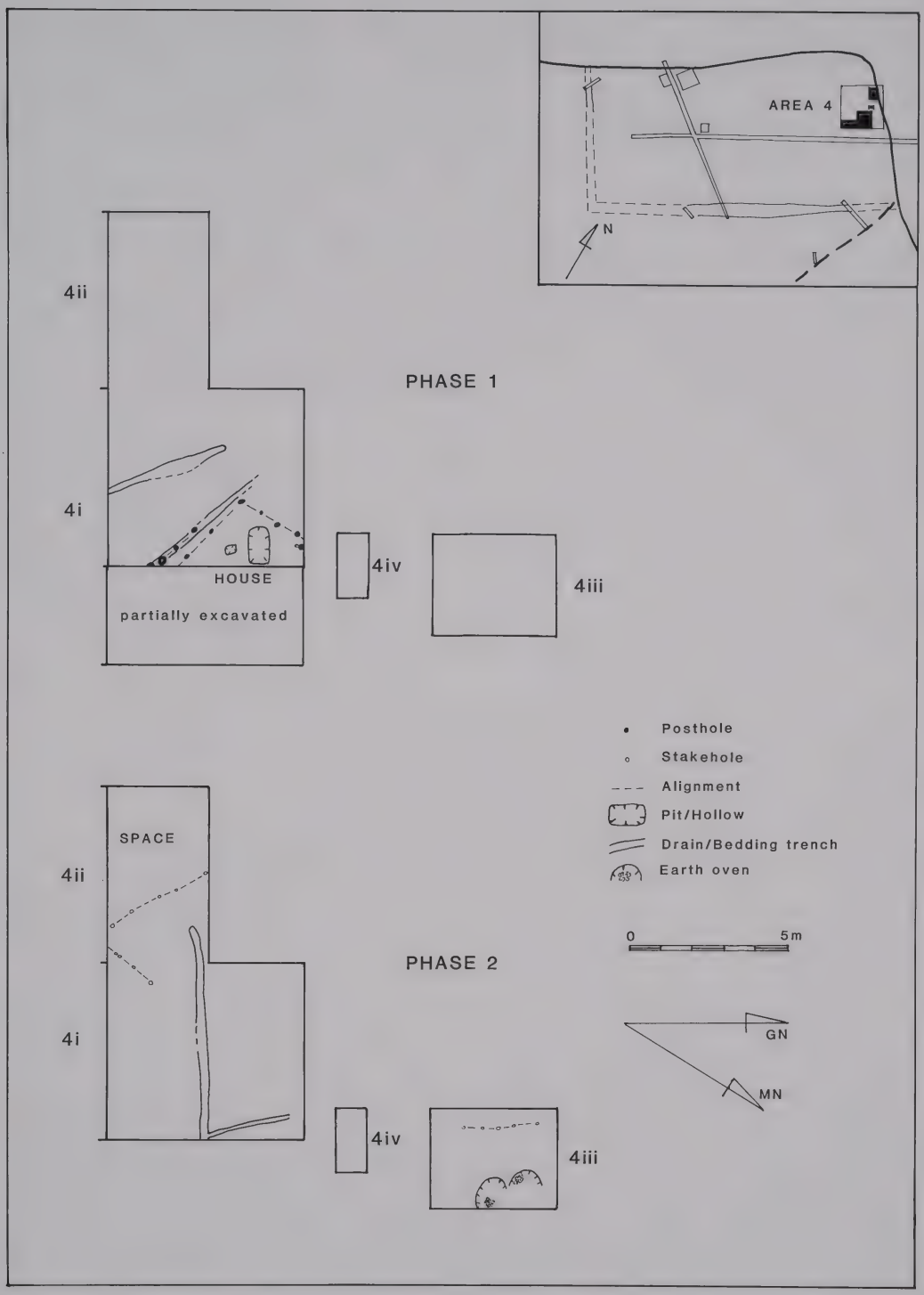


Fig. 2. Early phases of occupation in Area 4. Inset shows location of Area 4.

Phase 4. Overlying these features was a brown sandy soil, up to 180 mm thick, with a somewhat irregular surface (Fig. 3). It was thought to be a living surface derived from Waihou River sediments. The south-west part of this soil contained a shell midden, charcoal, a few fish, bird and dog bones, as well as three obsidian flakes. There was a thin lens of charcoal to the north. The layer thinned out in the east and was replaced by a disturbed clay layer, 50 mm thick.

Several features cut into this layer, including a major drain running from the west. The drain was 100-150 mm wide and 200 mm deep. It sloped at 8° towards the Ohinemuri River, and petered out before the eastern side of the square. Associated with the drain were two alignments of post and stakeholes. Some of the stakeholes in the north-east area may belong to this phase, but this could not be established with certainty because the sandy layer ran out. Another associated feature was a hangi (earth oven) 260 mm in diameter and 130 mm deep filled with stones and shell.

Phase 5. Overlying the soil was a later midden, 100-200 mm thick, comprising dark brown soil with shell, charcoal, a few fish and dog bones, and a few artefacts (Fig. 3). The artefacts included eight obsidian flakes (mainly on the northern side of the square), one chert flake, a piece of worked pumice (thought to be a fishing float), and a net weight.

Phase 6. At the north-east corner, a thin lens of black soil overlay the midden (Fig. 4), and was associated with a small area of firecracked stones, which may have been a plough disturbed hangi (cooking pit).

Phase 7. The upper surface of Layers 5 and 6 showed signs of topsoil development. This fact, combined with the numerous root holes, especially in the south-east corner, and a red ashy burnt patch with degraded wood, suggests a vegetation cover had developed after the settlement had been abandoned (Fig. 4).

Phase 8. Three rectangular patches of disturbed basal clay, two well-formed (2.5 m long and 0.5 m wide), and one smaller (1.2 x 0.4 m) and less well formed, were found to be more than 500 mm deep. They were cut into the basal clay after settlement had ceased, and on these bases are thought to be graves, probably dating to the Christian era (Fig. 4).

Area 4ii

To the south-west, an area of midden and fire-cracked cooking stones was investigated in order to compare it to the midden previously located in Area 3. This square, originally measuring 3 x 3 m, was excavated by hand, and was later extended to 3 x 5.5 m, joining Area 4i. Altogether Areas 4i and 4ii comprised almost 50 m^2.

Phases 2-3. As in Area 4i, the area had been scraped down to the base clay. One of the first features appeared to be a drain which began at the eastern edge of the square and connected with that found in Area 4i (Fig. 2). A line of five stakeholes ran north-west south-east across the square, possibly defining a boundary. The postholes and stakeholes in the west were of different appearance to those in the east of the square. The vacant space in between, may possibly have been a gap between two structures.

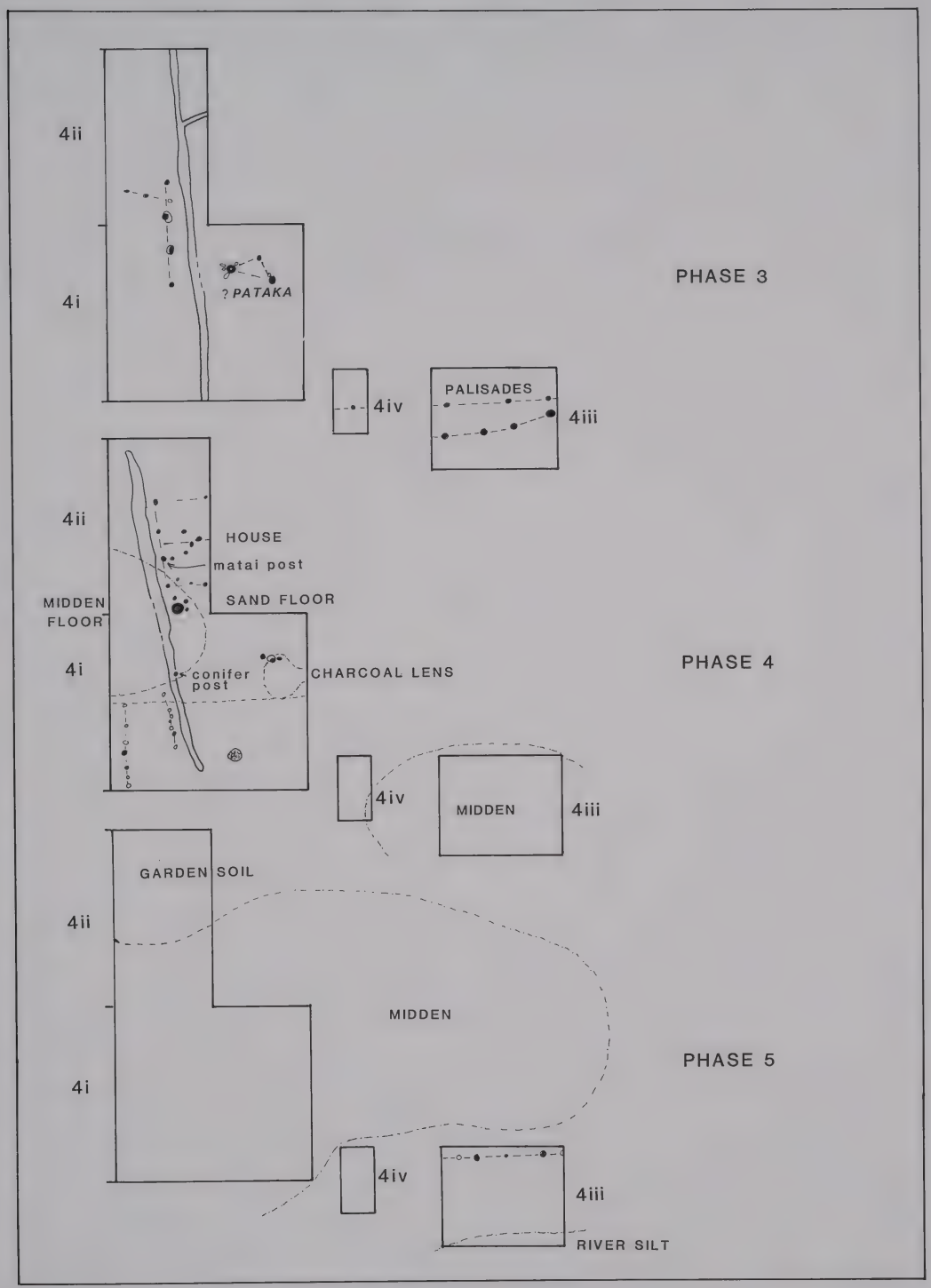


Fig. 3. Middle phases of occupation in Area 4. See Fig. 2 for key.

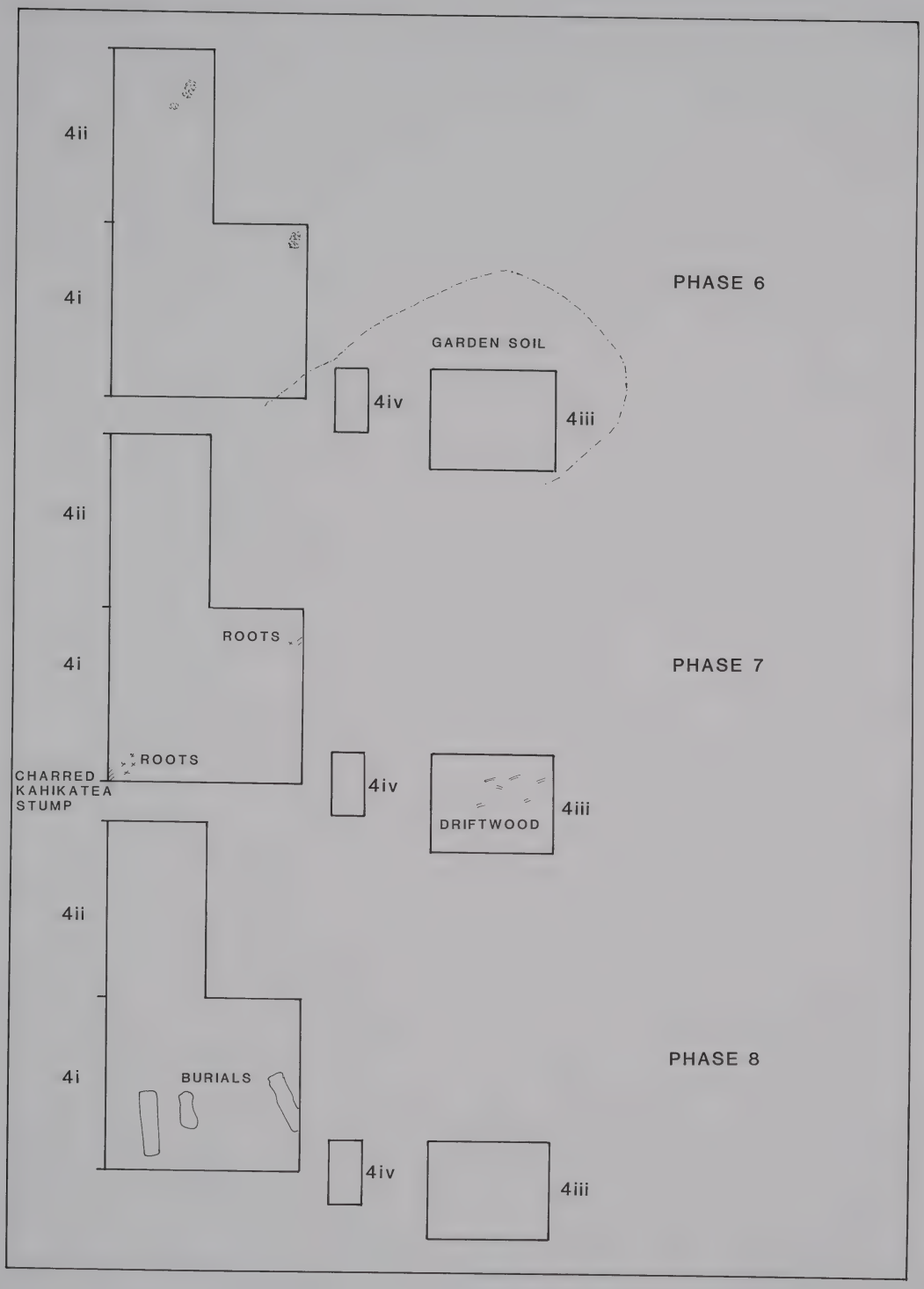


Fig. 4. Final phases of occupation in Area 4. See Fig. 2 for key.

Later the drain had been deepened and extensions added to drain areas to the west and north (Fig. 3). Two short posthole alignments appeared to represent structures associated with the drains. One of these alignments ran parallel to the drains and continued in Area 4i.

Phase 4. Overlying the first two layers a brown sand floor 100 mm thick had been laid down. In it were ten chert flakes and nine obsidian flakes located mainly in the south and west of the square. Associated with this layer was an unconcentrated midden comprising shell and fragments of fish, bird and mammal bone. The mammal bone was probably all derived from dog, though it may have incorporated some pig, and the majority of it was found in the fill of the earlier drains. Again a drain had been cut in the fill, although this was further to the south than before. It began on the west side of the square and ran east, joining up with the later drain in Area 4i. All the postholes of this phase were cut into the area north of the drain and several alignments could be determined. These could be interpreted as a house 2.6 m wide, extending north into the unexcavated area (Fig. 3).

Phase 5. Along the west side of Area 4ii was a mixed dark-brown soil 100 mm thick, which sloped at 1.5° to the west (Fig. 3). The soil contained an even mix of the underlying sand, with organic material, clay and charcoal. It has been interpreted as a garden soil. To the east there was a dark brown midden deposit 100-150 mm thick containing charcoal, fire-cracked stones, fish, dog and bird bone, and shell. There were 21 obsidian flakes mainly in the south-west of the area, and five chert flakes mainly in the south. The junction between these two layers was indistinct, so they have been assumed to be contemporary.

Phase 6. The last features in Area 4ii appeared to be a 100 mm deep hangi, measuring 500 x 700 mm (Fig. 4). It was filled with cooking stones, but there was no sign of charcoal or burning associated with the pit, indicating that the stones had been heated elsewhere. There was one other concentration of stones, but this appeared to have been disturbed by the ploughing.

Phase 7. Some time elapsed after Phase 5 and before the ploughing, since both the midden and the soil had a thinly developed topsoil.

Area 4iii

To the north-east an area 4 x 3 m was opened up to investigate the edge of the site where it sloped into the Ohinemuri River and to see if there was any evidence for palisade type defences. In this area too, the underlying base clay had been exposed by removal of the topsoil. At the western edge the clay was level but it sloped down steeply to the Ohinemuri River in the east.

Phase 2. The earliest features had been cut into the clay. They included two hangi cut into the river bank, incorporating fire-cracked stones, charcoal, fish and mammal bone, and clay flecks, as well as a line of at least five stakeholes along the top of the bank (Fig. 2).

Phase 3. Subsequently a double line of postholes had been cut into the top of the bank (Fig. 3). These probable palisade posts slanted outwards towards the river at an angle of 12-19° from the vertical. The two lines were 250-750 mm apart. The lower postholes were 600 mm deep whereas the upper ones were 300 mm deep.

Phase 4. Overlying the palisade postholes was a midden, containing a black charcoal-rich soil, shell, fish, dog and bird bone, also four flakes of obsidian and some fire-cracked stones. This material also comprised the fill of most of the postholes. The layer had been deposited mainly down the bank and was up to 200 mm deep, covering an area estimated to be 9 x 7 m.

Phase 5. Overlapping the midden was a wedge of brown-grey gritty silt interpreted as material which had been washed by the Ohinemuri River up on to the lower, eastern side. This layer, which reached up to 300 mm deep, contained no cultural material. However, on the top of the bank was a line of post and stakeholes (Fig. 3).

Phase 6. Above the midden was a black soil, 100-200 mm deep. This contained scattered fire-cracked stones, a few shells, fish bones and clay flecks, also five obsidian flakes and two chert flakes on the western side. The extent of the soil was approximately 12 x 6 m, extending right across Area 4iii and part way down the river bank, sloping at approximately 8°. The soil appeared to be well mixed and its limited extent suggested that it had been deliberately deposited over the area, and then used as a garden. This layer petered out in the north-east corner of Area 4i.

Phase 7. Layer 6 contained quite a bit of driftwood and the upper surface had a partly developed topsoil (Fig. 4). Again this suggests that the entire site was abandoned before the deposition of rock flour silt.

Area 4iv

An area 2 x 1 m was excavated in between Areas 4i and 4iii in order to correlate the stratigraphy.

Phase 3. The earliest features were cut into the clay, and included one palisade posthole which slanted at 10° (Fig. 3).

Phase 4. A corner of the midden located in Area 4iii continued in this excavation area. However, it was not associated with either midden in Area 4i (Fig. 3).

Phase 6. The black mixed soil found throughout Area 4iii was here found to be an average of 150 mm thick (Fig. 4).

Phase 7. A period of abandonment was again indicated by soil development on the top of Phase 6.

Phase 8. White clay lumps, probably associated with the excavation of the presumed graves in Area 4i, occurred on the top of the gardened soil, but beneath the rock flour. This would securely place the digging of these features between these two events.

TRENCH B

Trench B had been originally excavated in 1983 by Simon Best (Phillips 1986:94) to determine whether there were any cultural features in what appeared to be simply a grassed paddock. On finding subsurface evidence, the south face of the trench had been drawn rather quickly. In 1988 it was decided to scrape down the north face adjacent to the Area 4 excavations, and where the site sloped down into the Ohinemuri River, to clarify the stratigraphy (Fig. 5).

The basal clay was overlain by a dark soil, some of which contained a shell midden. This occupation layer was relatively horizontal, except at the eastern end where it dipped towards the Ohinemuri River and showed evidence of being scoured by the river. The occupation layer was overlain in turn by several layers of rock flour (the tailings from gold mining which were dumped into the Ohinemuri River). The lowest rock flour deposit was strongly banded, whereas the second and third deposits were composed of homogeneous yellow silt, separated by soil formation. At the west end of the section there was evidence of ploughing which had disturbed both the second rock flour and the cultural deposits. The ploughed zone was overlain by the third rock flour deposit which also had soil development on its surface. Finally, at the top of the section was a thin band of rock flour overlain by the current topsoil. The dating of the layers is discussed later.

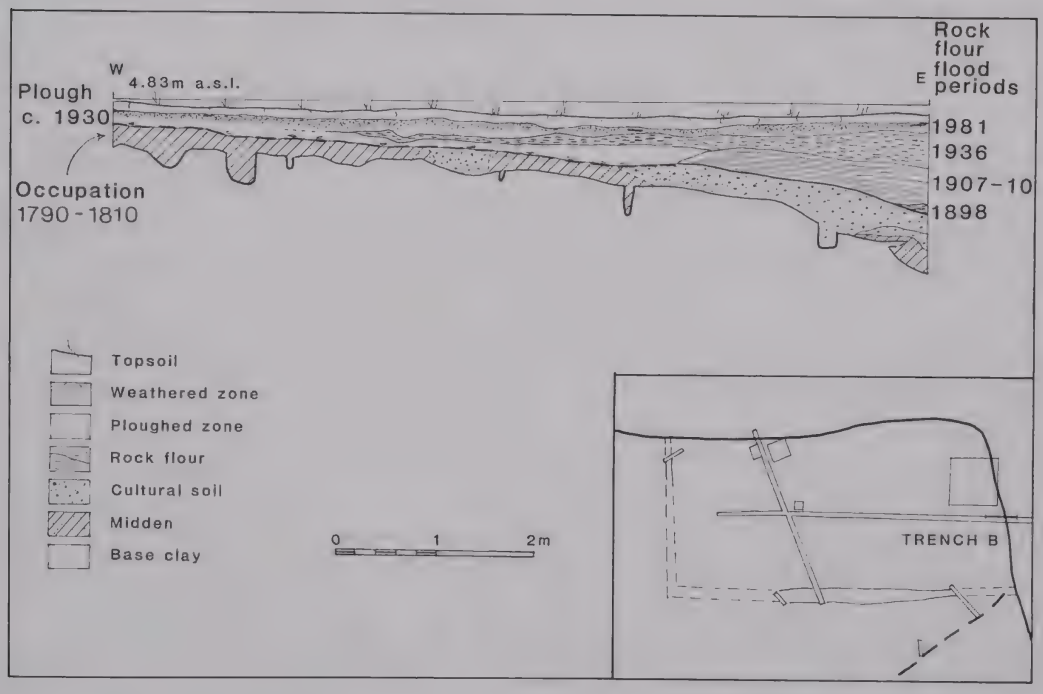


Fig. 5. Section of the north face of Trench B, adjacent to Area 4. Dates are from documentary sources referred to in text. Inset shows location of section.

PERIMETER TRENCHES

Several short trenches were excavated to examine the defences, the river edge, and the inland edge of the site outside the defences. These trenches were excavated by machine and scraped down by hand.

Trench H

This 7 m long trench (Fig. 1) was excavated where it was thought the defensive ditch might return at a right angle towards the Waihou River. The position was suggested by brief testing carried out in 1987 and by an old land map (D.O.S.L.I. 1903b) which showed a line thought to indicate a ditch.

The stratigraphy (Fig. 6) showed that the whole area had been occupied. A charcoal-rich black soil overlay the base clay. On the west side of the section this included a shell scatter. The defensive ditch cut through this layer down into the clay, to a depth of 1.6 m. The ditch here was V-shaped, being approximately 2 m wide at the top, and coming to a point at the base. The material dug out was heaped up inside the site in a rough bank, 2 m wide and 0.4 m high. The base of the ditch was filled with a 400 mm thick sandy sediment from the nearby Waihou River, and the ditch may have been deepened by the river washing up it. Subsequently, the bank had collapsed into the ditch, resulting in a mixed fill of clay and silt, including some debris washed in from the site, such as charcoal and fire-cracked stones. It appeared that one segment of the bank has been pushed into the ditch late in the sequence, possibly when the site was ploughed. Flood material had then washed over the top with the result that the ditch was not visible at all on the modern land surface.

Trench J

The trenches opened up in 1988 indicated that the defensive ditches were much deeper than originally thought. Therefore, a face 4.5 m long adjacent to the battered face excavated in 1987 was dug by machine to test this (Fig. 1). It should be noted that in 1984 the water table was very high, making any deep excavation impossible; in 1987 the soils were extremely dry, making hand excavation very hard and distinction between the base clay and clay fill difficult. Thus only in 1988, through a combination of moist soils and machine digging, was a proper recognition of the precise outline of the ditch in this part of the site finally achieved (Fig. 6).

The base of the ditch had been filled with clay which was slightly stained with charcoal, and was 500 mm deeper at this point than originally thought. The ditch was quite different in shape to that found in Trench H, being 3 m wide, 1. 5 m deep and rectangular in profile with a flattish bottom. No evidence of a bank was found in this trench.

Trench G

This 13 m long trench was excavated to investigate the low-lying ground to the south of the site (Fig. 1), which had been an old course of the Ohinemuri River, and to see how far the defensive ditch extended towards the present Ohinemuri River.

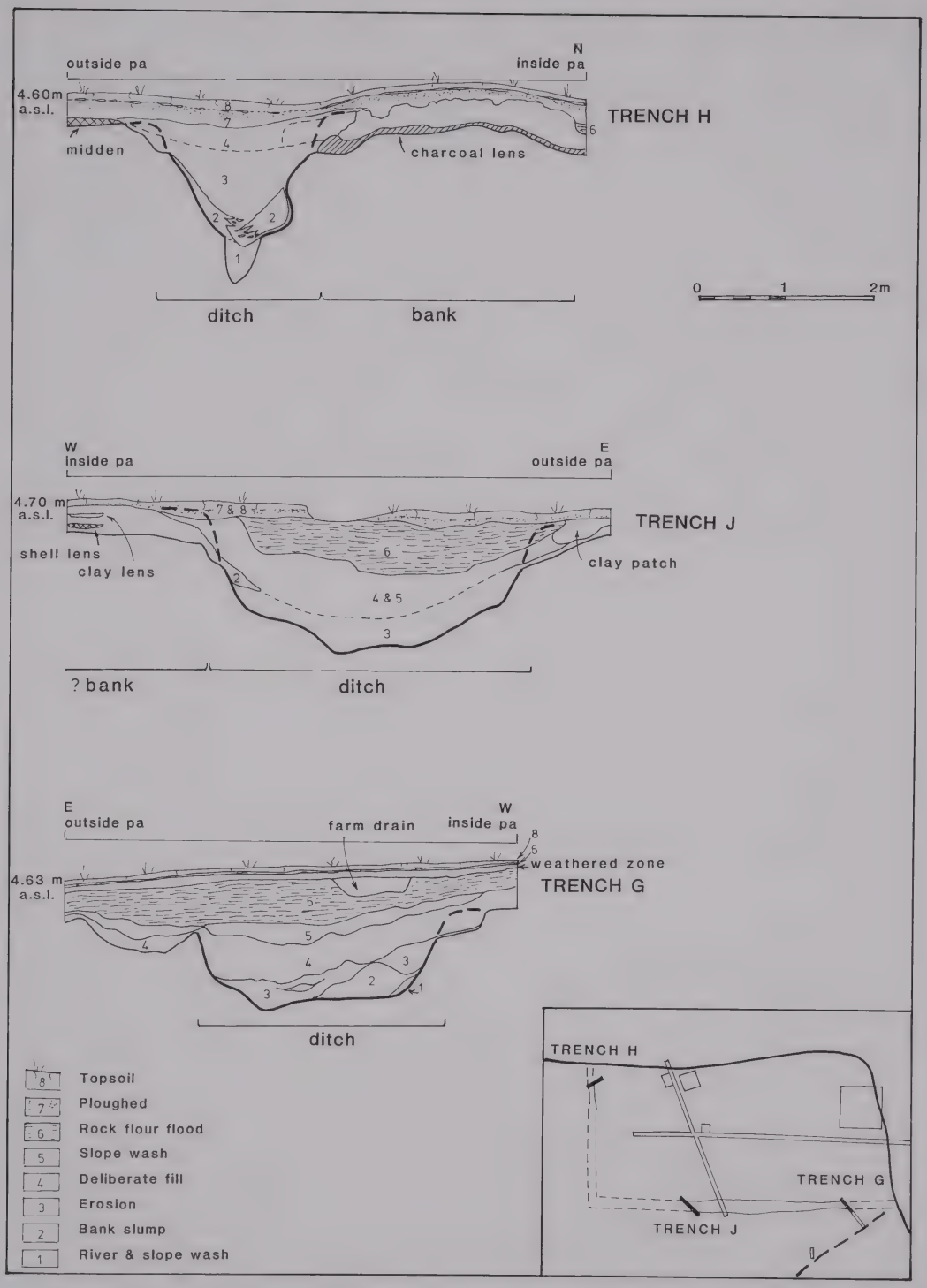


Fig. 6. Section of Trenches H. J and G, showing the ditch and bank defences. The sections have been corrected for the distortion of width caused by the angle of the trenches. Inset shows location of the trenches.

Here the ditch was 2.2 m wide and 0.8 m deep (Fig. 6). There was no sign of a bank. Neither was there any sign of cultural material or occupation adjacent to the ditch. However, blocks of charcoal-rich soil and occasional fire-cracked stones were found in the fill of the ditch, and blocks of its clay walls plus a grey silty clay lay in its base. The latter could have been washed in by the Ohinemuri River.

Immediately to the south of the ditch, and thus outside the defences, were a depression, a posthole and a scoop. These features and the ditch were filled with a black crumbly soil mixed with clay, on top of which was another black soil layer. These layers were overlain by the rock flour. Again there was no sign of the ditch on the surface.

In the southern part of the trench, the base clay dipped into what had been the Ohinemuri channel. This had been filled with a silty sediment, distinctively different from that found in the Waihou but typical of the Ohinemuri River. Overlying the parent clay on the site itself and the river silt was a 200 mm thick crumbly dark brown soil with charcoal flecks. It sloped down to the old river bed at angle of between 5° and 15°, and was interpreted as a possible garden soil. At the southern end there was a band of oxidised iron which suggests that this was permenently wet at some time, presumably after water tables had been affected by flooding. This band was in turn overlain by the rock flour.

Trench I

The position of the defences of the pa, thought to have been indicated by lines on an early survey map (D.O.S.L.I. 1903b), were confirmed by excavation of Trenches G, H, and J. The survey map had also shown a barbed-wire fence boundary, and it was thought that the ploughing might have been restricted to the area contained within the fence. Trench I, therefore, was placed outside both the known area of ploughed soils and the pa defences (Fig. 1). It was hoped that a relatively undisturbed area might reveal either the type of occupation outside the pa boundaries, or the natural soil profiles.

In the northern half of the section a posthole and a small scoop had been cut into the base clay. Both these features were filled with and covered by a dark brown soil containing charcoal fragments. To the south a grey clay graded into the base clay, and may represent an unmodified subsoil. These soils were overlain by the rock flour. Ploughing had taken place in this area, but it was generally shallow and only disturbed the rock flour.

DISCUSSION

SITE ENVIRONMENT

Reconstruction of the environmental setting provides an understanding of the resources available to the inhabitants of the site. Organic remains recovered during the investigations indicate which plant resources were actually being used. Archaeological and documentary evidence can be used to reconstruct the environmental history of the site after occupation ceased.

The natural environment

There are four major environmental zones within a 4 km radius of the site (Fig. 7). These are the peat swamp, the uplands, the kahikatea swamp, and the Ohinemuri and Waihou Rivers. The natural river levees on which the site is located are a restricted sub-zone of the kahikatea swamp.

Peat swamp. The centre of the Hauraki Plains is a dome of waterlogged peat. The Waihou River enters the margins of the peat swamp 10 km upstream from the site. This zone could have been the source of many animal and plant resources, such as waterfowl and eel, flax and raupo.

Upland. The soils of the Kaimai Ranges and Matamata hills are well drained loams and earths. Generally, the uplands support broadleaf/podocarp forest. This zone would have provided timber, often in the form of driftwood. The nearby Kaimai Ranges would also have provided a ready source of cooking stone.

Kahikatea swamp. This is a zone of low-lying gley soils on the margin of the Hauraki Plains. The vegetation is mainly kahikatea forest. This zone is a relatively impoverished one, both for culturally useful products and for occupation.

River levees. The raised levees caused by river flooding and meanders are generally better drained than the kahikatea or peat swamps. This would be more true of the sandy deposits of the Waihou River, than the river silts deposited by the Ohinemuri River. Raupa is a good example of this, since there the underlying clays have been scoured by a meander of the Waihou, leaving a deposit of Waihou sandy loam up to 2 m thick; whereas Waiwhau lies on the Ohinemuri derived Waikino silty clay soils. It is interesting that this area is dominated by river meanders, so that levees back on to themselves, forming large areas of raised ground, drier than the surrounding environment. This is especially true at the junction of these two major rivers (note also the levees at the downstream junction of the Waihou and Hikutaia Rivers). It seems likely that these areas were specially selected for occupation and cultivation.

Rivers. The Ohinemuri rises near Waihi in the Kaimai Ranges, while the Waihou originates in the hills above Matamata. Waiwhau is located at the junction of these two major rivers which then flow north to the Firth of Thames, 35 km downstream. This zone provided drinking water and fresh water fish, including the economically important eel. The rivers comprised a transport route to all the other zones.

Exploitation of plant resources

Pieces of charcoal, wood and fruit stones were found mainly within the midden layers, Phases 4-6 (Appendix 1). These presumably represent remnants from fires as well as the remains of structures and food debris. There were at least 21 different species. Most were forest trees such as matai (*Prumnopitys taxifolia*) and tawa (*Beilschmiedia tawa*), as well as smaller trees such as ramarama (*Lophomyrtus bullata*) and manuka (*Leptospermum scoparium*). Hebe and coprosma also occur. The fact that the charcoal was derived mainly from trees, with only a few twigs,

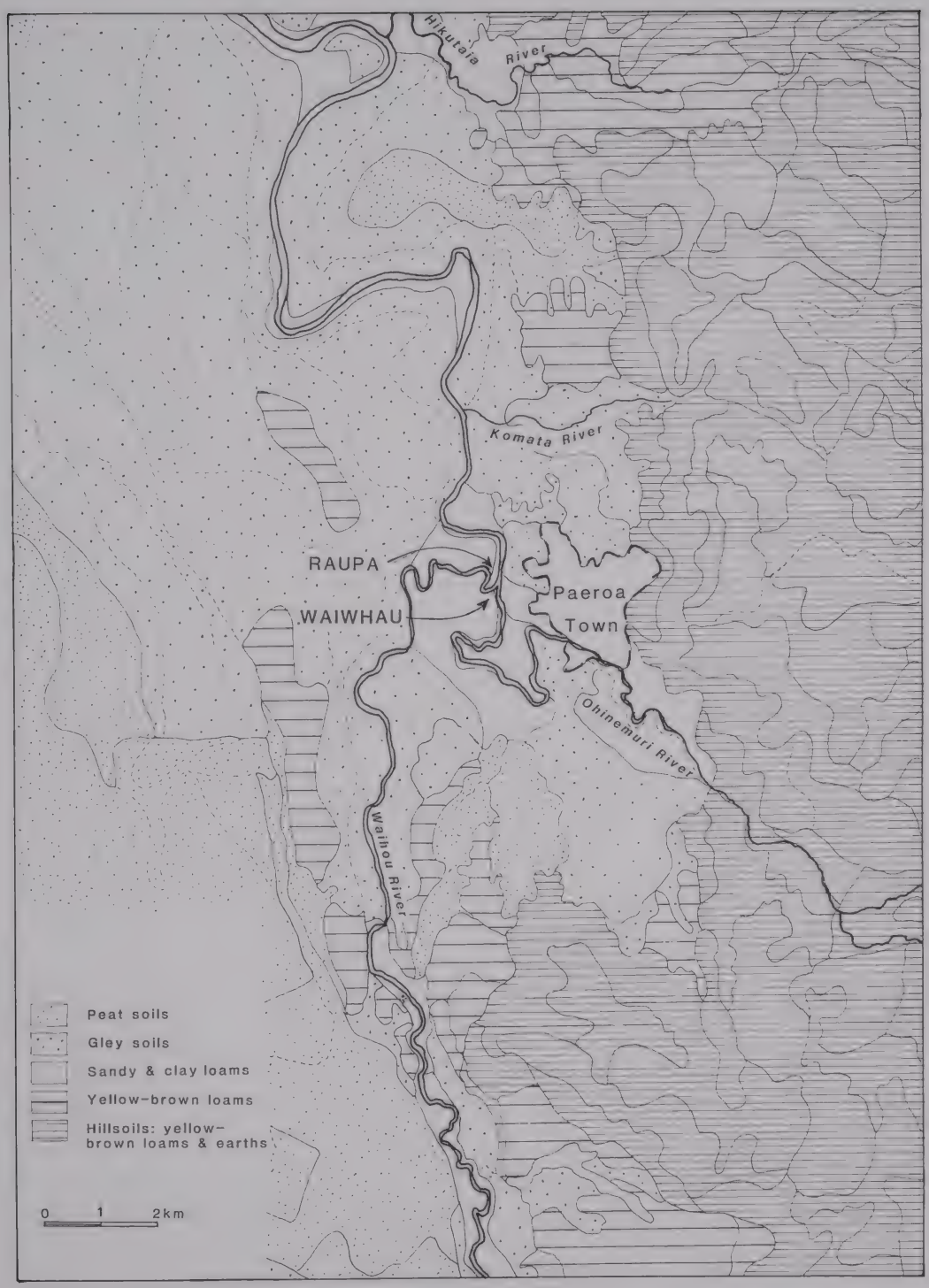


Fig. 7. Map of soil distribution in the region of Waiwhau. Based on Trustrum and Crippen 1986.

suggests that firewood was not in the main collected from the local environment but was largely driftwood. Both rivers at present contain much driftwood which in times of flood is deposited on the site. It appears from the amount of wood found beneath the rock flour in Area 4iii, that this also occurred before the major flood episodes of the late 19th and early 20th century. Thus driftwood could have been a major source of firewood for the occupants. Fruit stones from karaka (*Corynocarpus laevigatus*), tawa/taraire (*B. tawa/tarairi*), and hinau (*Elaeocarpus dentatus*) may represent trees planted on site or food brought to the site. Two wood samples came from posts. These were matai and a very degraded specimen which could only be identified as a conifer.

The previous excavations recorded similar findings. These included the remains of totara (*Podocarpus totara*) and matai posts, tawa/taraire fruit stones, and charcoal from fires. The species used for firewood were largely the same as those used in Area 4, with the addition of beech (*Nothofagus* sp.). The finding of beech at this altitude supports the idea that driftwood was a source of timber (Phillips 1988:62).

Post-occupational changes

A kahikatea root that had intruded on the occupation was partly burnt before the rock flour deposit. This suggests some regeneration of vegetation after the abandonment of the site. Old land maps (D.O.S.L.I. 1884a and b) show that by that date kahikatea had been cleared well back from the rivers, especially in the vicinity of Waiwhau. The banks at that time were covered in patches of high manuka and low scrub (Fig. 8).

The occupation is sealed by layers of rock flour, the result of tailings from gold mining being dumped in the upper reaches of the Ohinemuri River from 1895. These tailings which blocked the waterways, along with forest clearance of the hills, resulted in massive flooding of the low-lying regions of the Hauraki Plains. Major floods occurred in 1898, 1907, 1910, 1936 and 1981 (Barber 1985). Four distinct layers of rock flour are evident on the site. The lowest is a banded orange-yellow layer, followed by at least two homogeneous yellow layers divided by soil formation (Fig. 5). Some soil formation is also evident on top of this layer. The uppermost layer is a thin band immediately below the topsoil. These layers can be equated with the recorded flood epsiodes.

An old land map of 1903 (D.O.S.L.I. 1903b) suggests that manuka, cabbage trees (*Cordyline australis*) and briars (?*Rosa* sp.) were present (Fig. 8). By this time the "Native Burial Ground" of Waiwhau had been fenced off.

The site and adjoining land of Waiwhau North was partitioned from the land blocks Waiwhau Middle and Waiwhau South in 1933. It is possible that at this time the site was ploughed to bring it into grass production. Certainly, there is evidence of ploughing after the first two episodes of flood debris and before the upper two, which would place it sometime between 1910-36. Traces of tracks were found at this level in Area 4i which could have been made by the vehicle that pulled the plough. These consisted of a series of linear indentations measuring 280 mm wide, 160 mm apart, consistent with the treads of a steel wheeled or tracklaying tractor. In the higher areas of Waiwhau ploughing disturbed the occupation layer.

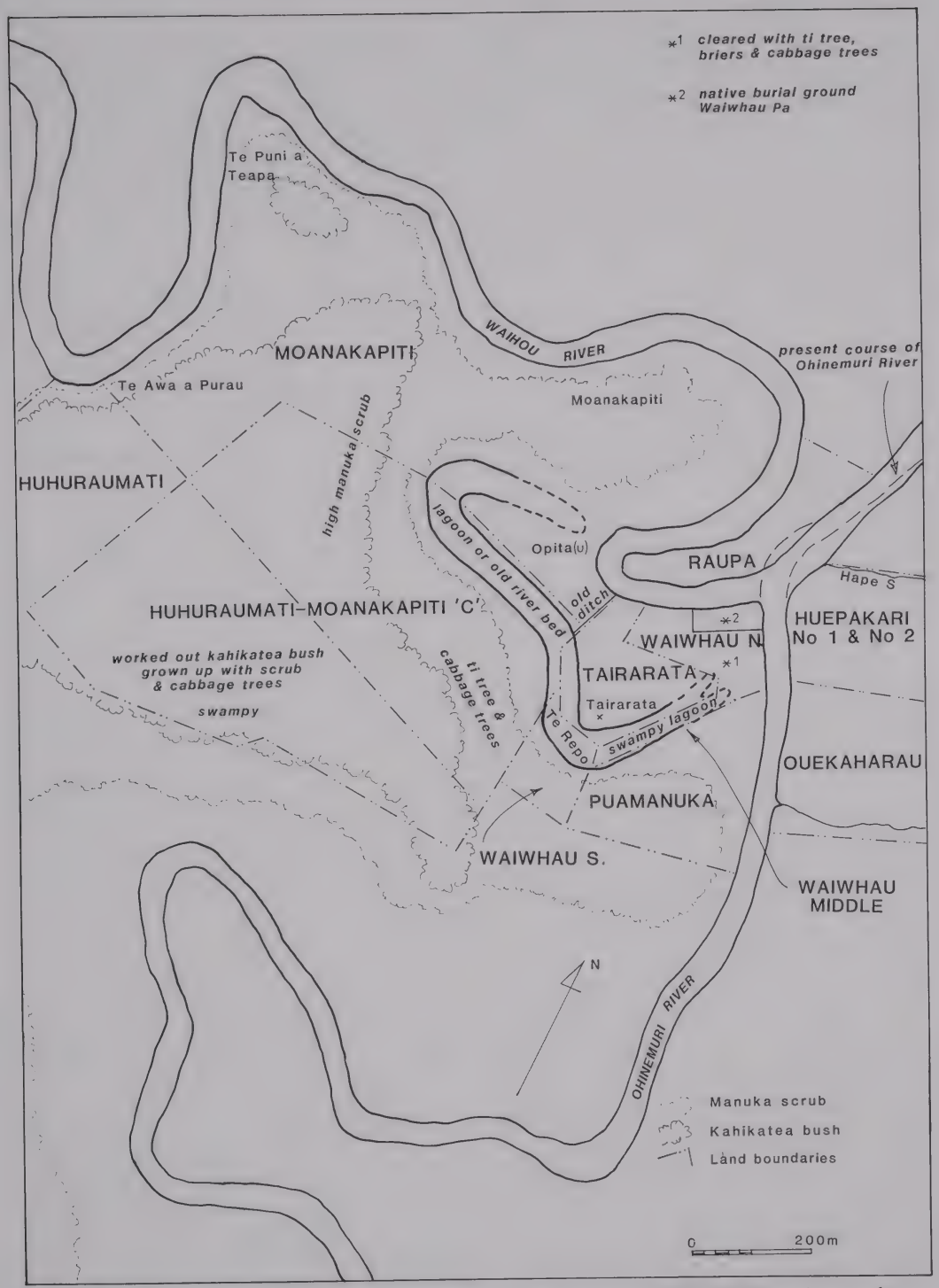


Fig. 8. Vegetation, land blocks boundaries and river courses 1887-1903. Based on early plans of land blocks (D.O.S.L.I. 1878a and b, 1879, 1880, 1884a and b, 1887, 1890, 1903a and b).

Attempts to protect farmland from flooding began in 1910. Stopbank construction began in 1913 and the Waihou River was re-channelled to the west, leaving a shallow pond where the channel had been. Even after extensive stopbanking, river re-channelling and floodgate construction, the worst flood on record occurred in 1981. Further stopbank and berm construction began in 1983. This destroyed a small portion of the south-west corner of Waiwhau, exposing cultural deposits in the cut bank.

SETTLEMENT FEATURES AND ACTIVITIES

Indications of different types of settlement activities, such as gardening, housing, cooking, storage, defence, manufacture and burial, can be identified in the occupation sequence. Evidence of these activities was found over the entire area examined. Some activities were concentrated, and in some places the activities had changed over time. Each of these activities is discussed separately below.

Gardening

Soils were observed in various parts of the excavation which had several characteristics in common, including stratigraphic position, depth, compositional inclusions, slope and area. They have been interpreted as garden soils (Fig. 9).

The soils overlay the base clay or other cultural layers very distinctly, which suggests deliberate placement. They were often up to 200 mm deep. Another feature was the mixing of occasional cultural material (shell, charcoal, fire-cracked stones), with some subsoil and base clay. In all recorded instances these soils were on a slight slope ranging from 2-15^0, and they were observed mainly on the edge of the site. Their extent was only measured in Area 4iii, where it was approximately 60 m^2.

Jan Coates (pers. comm.) has suggested, on the basis of these observations, that on a clay base gardens might be placed on sloping ground to provide drainage. It is possible that a series of small gardens were placed around the edge of the site where there was a natural slope down to the river's edge, or at other places draining down to lower ground. Soil suitable for gardening would have been brought from other parts of the site to these better locations. A possible example can be seen in Trench G, where no subsoil or topsoil is present at the northern end. In fact, several features have been truncated, and there is a thick layer of soil to the south. Such gardening probably took place throughout the sequence, although the soils so far identified belonged to the post-defensive period.

It is generally assumed that kumara was the crop grown on Maori sites, yet potatoes, turnips, cabbage and maize had been incorporated into Maori gardens early in the nineteenth century in many areas (Leach 1984). In 1801 a group of missionaries who visited the Thames district and sailed up the Waihou River two miles (3.2km) upstream from the Hikutaia River junction recorded that European potatoes and turnips were being grown (Anon. 1801). In June and July 1820, Marsden travelled up the Waihou River and stopped at a village one hour's walk downstream from Raupa where he was presented ". . . with plenty of fine potatoes . . ." (Elder 1932:263). It is likely that potatoes that were grown on the ill-draining Waikino silty clay soils at Waiwhau, since kumara required good drainage.

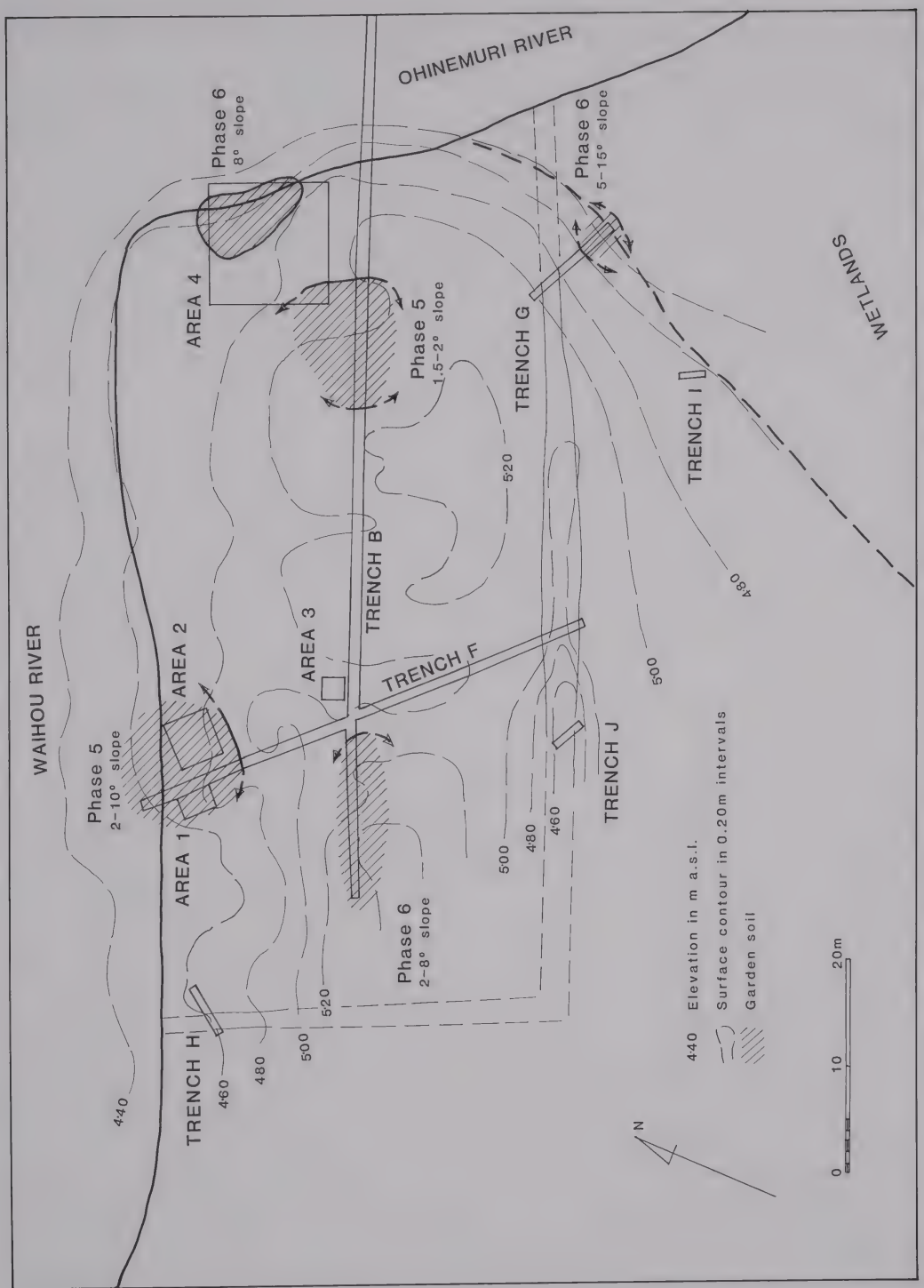


Fig. 9. Map showing contours of modern land surface of Waiwhau site and areas of possible garden soils.

Housing

The previous excavation of Areas 1 and 2 uncovered several posthole alignments, some of them set in bedding trenches, on a levelled area of ground. This was interpreted as a house 7.5 m long and 3.5 m wide with a double line of central postholes (Phillips 1988:60, Fig. 6). Excavation Areas 4i and 4ii uncovered many postholes and some possible bedding trenches, which can be interpreted as two possible houses, one approximately 4.8 m wide (Fig. 2) and the second 2.6 m wide (Fig. 3). These structures were not fully excavated so the lengths could not be determined. The widths of these three examples suggest small living houses, or possibly temporary dwellings (Prickett 1982).

Cooking — food refuse

Three distinct patches of shell-rich debris were located. The middens at the south of Area 4i/ii and at the north-east of Area 4iii belonged to Phase 4, while a later midden overlying most of Area 4 was deposited during Phase 5 (Fig. 3). The areal extent of these middens was from approximately 35 to over 250 m^2.

Five midden samples were collected. The samples were wet sieved with a 2 mm sieve and stones, charcoal and soil were removed. Further sieving into pieces greater than 4 mm, between 4-2 mm and less than 2 mm was done to give an indication of the amount of crushing that had taken place. The only faunal material in the samples was marine shell. This was identified and weighed (Appendix 2). The shell from both the early and late midden samples was almost identical, in that it consisted mainly (89%) of pipi (*Paphies australis*) with 10% cockle (*Chione stutchburyi*). The remaining 1% comprised individual specimens of whelk (*Cominella* sp.), trough shell (*Mactra ovata*) and an unidentified gastropod. Both the early and late middens were crushed to the same extent. The proportions of shellfish species in these middens is remarkably similar to the Area 3 midden excavated in 1987 which showed 85% pipi and 8% cockle and a few other estuarine and tidal flat species (Barr & Eaves n.d.).

Hand excavation revealed various bones, as well as fruit stones within the occupation layers. These were removed and identified separately.

Bird, fish, dog and possibly pig bones were recovered (Appendix 3). Most was fragmentary and the assemblages were very small, therefore no attempt was made to ascertain the minimum numbers of individuals. None of the bird bones were identified. Amongst the fish only three bones belonging to snapper (*Chrysophrys auratus*) and an elasmobranch were identified. It is notable that in an area famous for eel fishing that no eel bones were recorded. Several dog bones, some unidentifiable mammal bones and a possible pig bone were recovered, the majority of which came from Phase 4 in the occupation. Despite the uncertainty of the identification of pig bone in this area of the site (see note Appendix 3), pig bone has previously been collected from the midden in Area 3 from a context late in the occupation of the site (Phillips 1988:63).

The fruit stones are the only vegetable remains recovered. They included karaka, hinau and tawa or taraire (Appendix 1). It was noticable that all were extensively charred and that only the karaka stone was intact, the rest being in halves.

Although shellfish, birds and fish are very likely to have been indigenous and dogs were a pre-European introduction, pigs are obviously a more recent addition to the Maori diet and can therefore be used as an indicator of the date of the occupation. The missionaries who travelled up the Waihou River to 12 km from Waiwhau in 1801 reported that ". . . no quadrupeds of any kind are to be found except dogs and rats and these are not very numerous" (Anon. 1801:29). Pigs, however, must have been introduced not long after this period, as they appeared to be fairly common by the second decade of the nineteenth century. In January 1815, Marsden visited the west coast of the Firth of Thames and recorded ". . . some very fat hogs . . ." (Elder 1932:106). Later, in June and July 1820, he travelled up the Waihou River, stayed at Raupa and following the Ohinemuri crossed over the Kaimai Range to Tauranga. When he stopped at a village one hour's walk downstream from Raupa he was presented with ". . . a good hog" (Elder 1932:263), and at Tauranga he states ". . . they had plenty of potatoes and also pork" (Elder 1932:268).

Cooking — earth ovens

Other evidence of cooking was the presence of hangi. These were in the form of small circular pits filled with fire-cracked stones. Generally they did not include much charcoal. In Area 4 these pits were 250-800 mm in diameter and up to 200 mm deep.

Six pits had previously been found in Area 1 and Area 2. Three were accompanied by a large amount of charcoal but with little stone and tended to be larger (1 m in diameter), while the other three were smaller (300 mm in diameter) and included stones. It was suggested that the stones were heated in the large pits and then transported to the smaller pits where the actual cooking took place.

Storage

Few indications of storage occur on the site, the one certain example being a small pit in Area 4 (Fig. 2). There were also several stakehole alignments, some of which could represent racks. In addition, it is tempting to interpret three large postholes as the remains of a pataka (Fig. 3); on a low-lying site above ground storage must have been a priority.

Defence

The site had been made into a pa at some point in its history. Evidence for its defence could be seen in the construction of a ditch on the western and southern sides; and in a surrounding palisade on the eastern and northern sides. The defences enclosed an area 105 x 50 m (5355 m^2).

Excavated sections across the ditch in four places indicated it varied considerably in dimensions and shape. It was from 2-3 m wide and 0.8-1.5 m deep (Fig. 6). In some places there was evidence of a small bank. The base of the ditch varied between 3-3.4 m a.s.l., and part of it would have been flooded in times of high water. Approximately 20-30% of the ditch was filled by natural erosion. A further 50-70% appeared to have been deliberately filled between the first and second or third episodes of rock flour deposition (i.e. between 1898 and either 1907/10 or 1936).

The palisade was represented by a double alignment of sloping postholes. In Area 4 the outer line of postholes was 600 mm deep and the inner line was 300 mm deep. The postholes were associated with Phase 3 of the occupation sequence.

Overall, these findings suggest that the defence at Waiwhau was not formidable, since the palisades cannot have been large and the ditch was not very deep. Thus, Waiwhau provides a contrast to the neighbouring site of Raupa, where the ditches were approximately the same size but the palisades, set in holes 1.7 m deep, were obviously much more impressive. A site of the same period as Waiwhau that might have been similarly defended was seen by the missionaries who sailed up the Firth of Thames on board the 'Royal Admiral' in 1801. They recorded visiting a settlement in the Thames region, "About 20 yards from the water side we saw a fence, or pailing, 5 feet high with an opening in the middle to enter in, within were their huts" (Anon. 1801). The fact that occupation deposits covered the palisade postholes, and the lack of decomposed posts (where other wood did survive on the site), suggests that the palisades were removed, and that the defensive period was not long-lasting. It would be unlikely that a pa would be abandoned leaving the defences intact which could then be used by hostile tribes, especially one so near other centres of occupation. Palisade posts must also have been removed from Raupa, for when Henry Williams visited the pa some 10 years after its abandonment he recorded, "No one here; nor any fences up to indicate a fortress . . ." (Williams 1833).

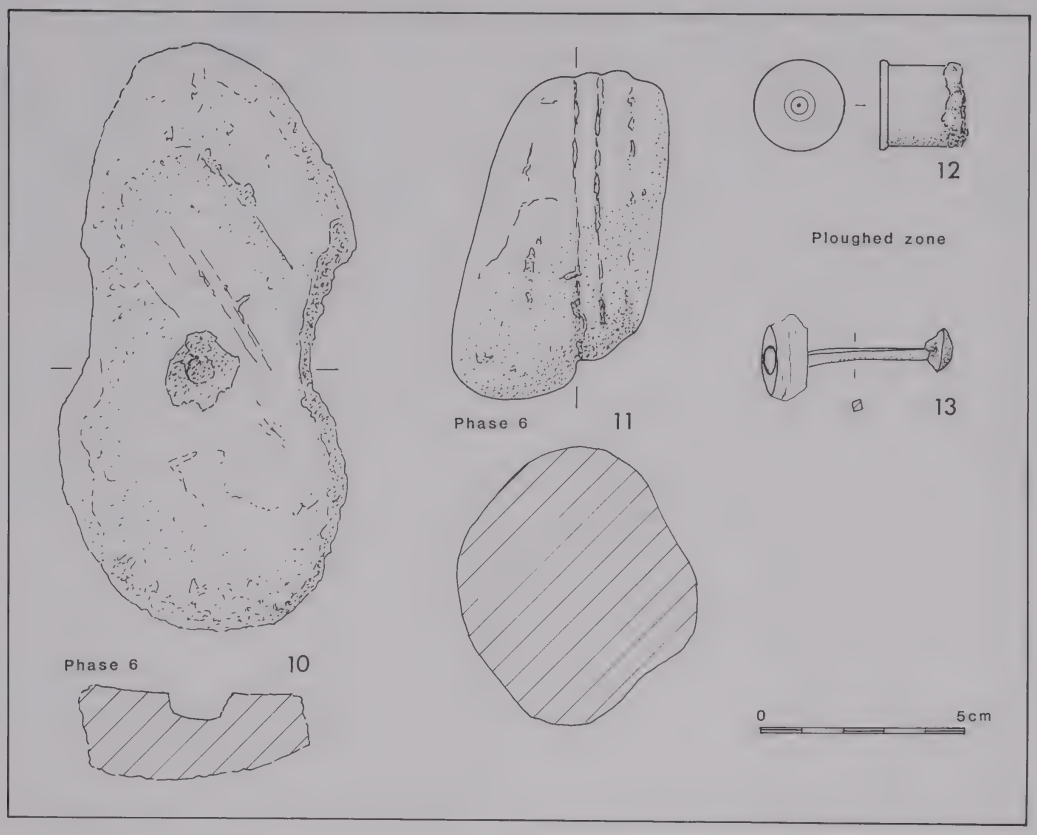
Tool use

The portable artefacts in Area 4 included: 53 flakes of obsidian, 26 flakes of chert, three pieces of greywacke, two pieces of sinter, some red ochre and other assorted fragments. Some of the flakes had signs of use-wear on them and a few appeared to have been used as drills. There were also a pumice fishing float (Fig. 10), a net weight (Fig. 11), a few grinding stones and some greywacke fragments (possibly adze chips). European items included a nail, some rusted iron fragments possibly barbed wire or nails (one was found embedded in a piece of wood, shown in Fig. 13) and a shotgun casing (Fig. 12). As in Areas 1-3, these European items were all found within the upper ploughed layer.

The most common source for the obsidian was Mayor Island (53%), the next most common was the 'grey' obsidian possibly from Whangamata (34%), the remainder being from Waihi, with two fragments identified from the Pungaere source in Northland. The density of the pieces was less than one per square metre. This fact, together with the small size of the flakes suggests that they were waste fragments that had become incorporated into the midden. The other stone material was similar to that sourced previously to the surrounding uplands (Phillips 1988:66-7, 69).

Burial

Three rectangular areas of clay were found within Area 4i (Fig. 4). Owing to their depth and their shape it was assumed that they were Christian burials of at least two adults and possibly one child. These inhumations were made after the habitation at the settlement had ceased, possibly after a period of revegetation on the site (Phase 7).



Figs. 10-13. Artefacts from Waiwhau Area 4. 10. Pumice float. 11. Net weight. 12. Shotgun casing. 13. Nail embedded in fragment of wood.

Several burials had been found in Area 2 in 1987. In contrast to the late burials, these were of very young children (6 months-2 years old) and were deposited in shallow pits in a coiled position. They derived from the earliest level of occupation in Area 2 (Phase 1 or 2).

CHANGES THROUGH TIME

The longest period of occupation at Waiwhau appears to have been in Area 4 where six occupation phases were identified. Elsewhere there were from two to four occupation phases. Because of the ploughing it is not always easy to correlate these phases throughout the site, except where they are associated with the defensive features. Assuming that the ditch and large posts around the site circumference all relate to one episode, then the major phases of pre-defensive, defensive and post-defensive occupation can be described. The later phases of abandonment, farming and flooding can also be identified throughout the site.

Pre-defensive occupation

Only scattered evidence exists for occupation prior to the defenses (Phases 1 and 2). This is in the form of charcoal and shell lenses in Trench H and in the western end of Trench B. In Area 2 there are four child burials. It is most concentrated in Area 4 at the junction of the two rivers, where there are small store pits, possibly a small house, drains, stakehole alignments and hangi. The small amount of evidence from this period suggests that the occupation lasted only a brief time before the defence of the site (Fig. 14).

Defended occupation

Apart from the defensive features of large postholes and the ditch there appears to have been a major working of the soil in Phase 3 although there are few features (Fig. 14). In Areas 1 and 2 a terrace was levelled for the construction of a house. In addition, a hut or store was erected in Area 3, and in Area 4 there are drains and postholes. Other occasional features such as postholes and hangi may relate to this phase.

Post-defensive occupation

The defensive phase seems to have been short-lived. During the three phases that followed the bank collapsed into the ditch, followed by several layers of infilling. The palisade postholes within Area 4 soon became covered with other layers, suggesting the posts had been removed rather than being left to rot away. In Areas 1 and 2 the house appeared to have burnt down and a charcoal lens was deposited (Fig. 14). The charcoal-rich hangi and obsidian working floor could also belong to this phase. The obsidian working occurred earlier in the sequence, if one adheres to the premise that obsidian was quickly replaced by iron tools. However, it may have also had ceremonial uses (e.g., in funeral rites) which continued after the introduction of imported iron for more practical tasks. In the northern section of Trench F there was a floor, garden soil and postholes; while in the central section and in Area 3 there was midden. In Area 4i/ii there was a house, drain, hangi, and stake alignment; followed by a garden and midden; and finally three hangi. In 4iii there was a midden, followed by a garden. In Trench G there was a garden soil. Other patches of soil, charcoal, sand and clay seen in the sections indicate disturbance of the ground.

Abandonment

Evidence of abandonment occurred everywhere in the form of soil formation and the accumulation of driftwood. The 'Christian' style burials in Area 4i belong to this phase (Fig. 14).

Floods

Deposits indicating three main episodes of flooding were seen on the site. The first was marked by coloured bands of rock flour, presumably the floods of 1898. The later material was homogeneous, presumably reworked in the river, and may represent the 1907, 1910 and 1936 flooding periods. The last flood material that can be seen just below the turf represents the recent 1981 flood. This sequence is best seen in the section of Trench B (Fig. 5).

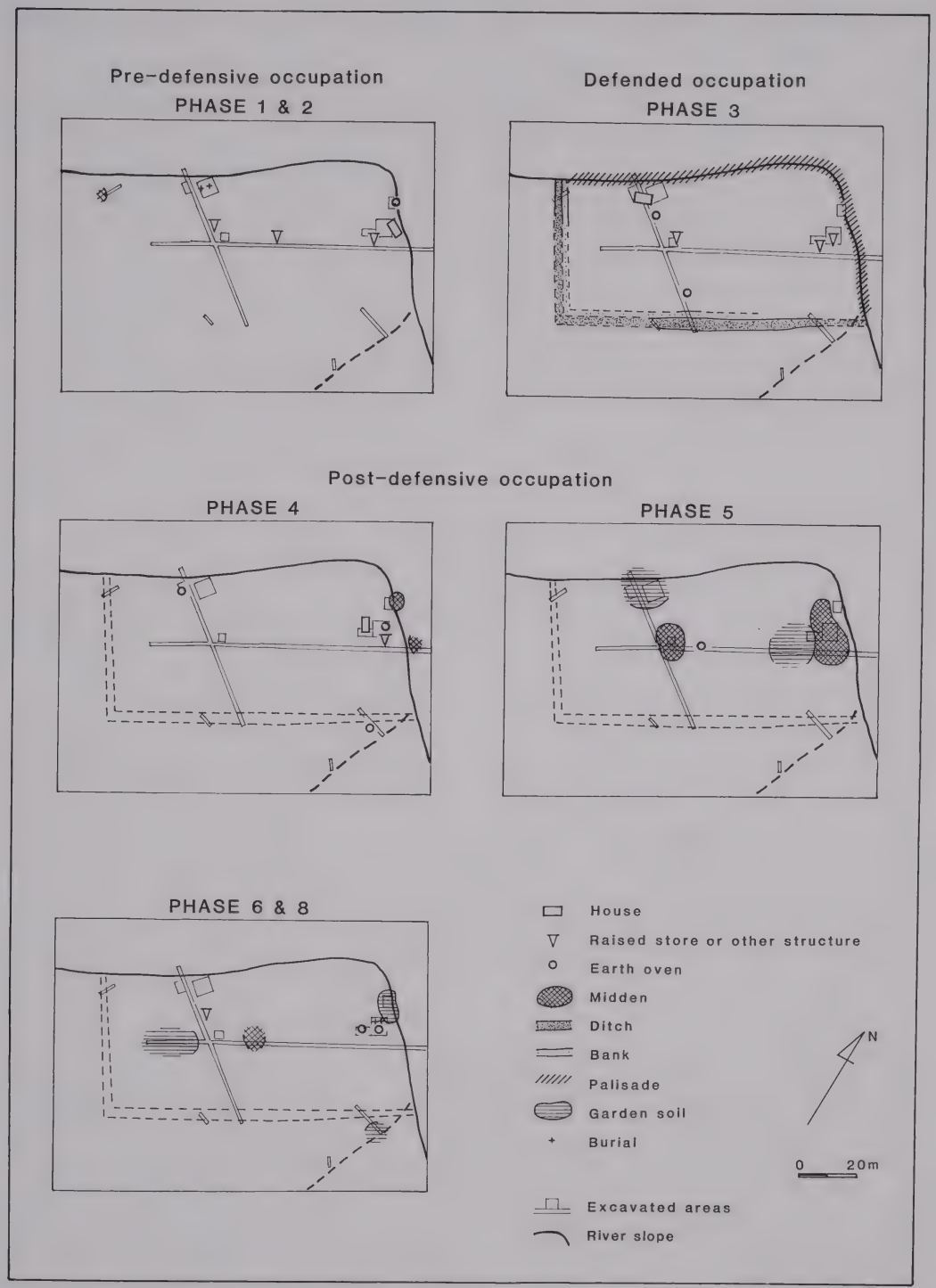


Fig. 14. Changing patterns of settlement at Waiwhau.

Farming

Evidence of farming includes drains, presumably dug to drain lowlying wet areas, barbed wire fragments from old fences, and ploughing which affected most of the site. The drains and ploughing occurred after the earlier floods and probably represented an effort to bring the land into grass. The use of the lands system of ploughing indicates that this episode took place early in the 20th century. Tracks from a steel wheeled, or tracklaying, tractor found in Area 4i between the rock flour deposits (dated 1910 and 1936), probably relate to this event.

ASSOCIATION OF FEATURES

In the previous discussion various features have been associated with certain activities, e.g. posthole alignments were equated with housing. These associations will be tested by looking at how often the features co-relate. An extension of this test will be to see how often different activities are grouped on the site. At Waiwhau some 18 different features were identified. These occur at varying frequencies throughout the excavation areas and trenches (Fig. 15).

Defensive features and postholes

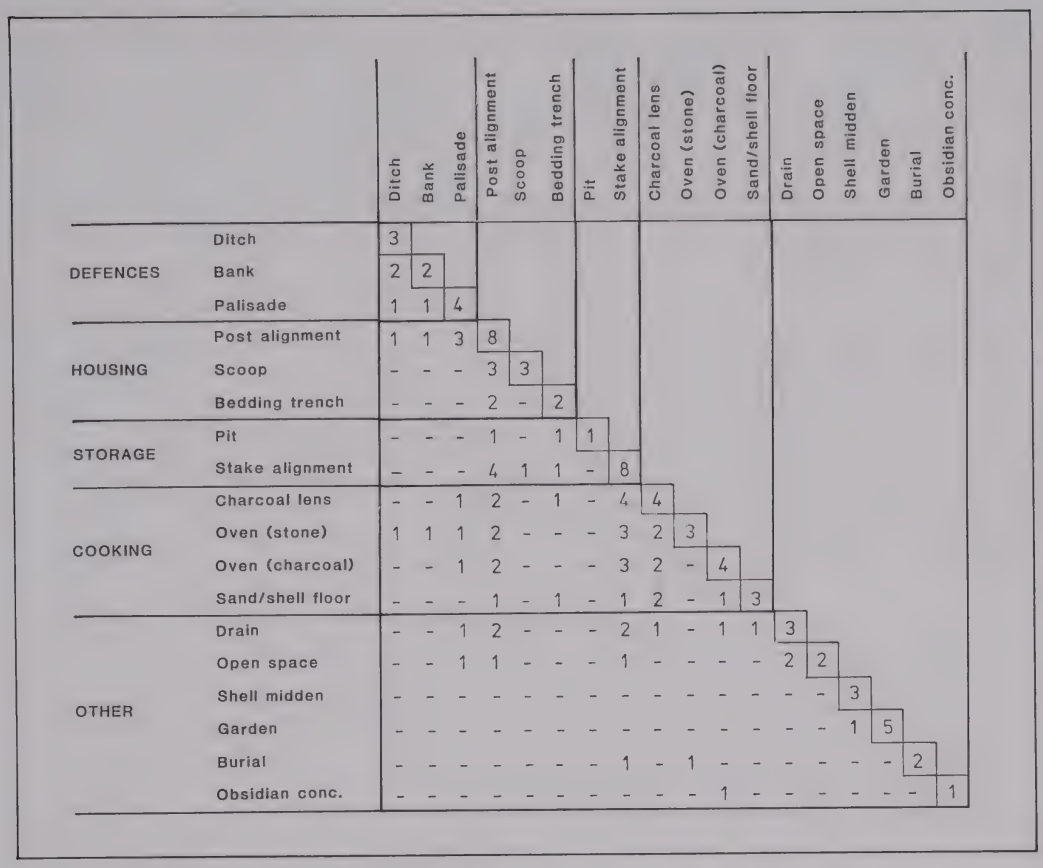
Ditches, banks and large outward-sloping postholes for palisading were all identified as defensive features. There is a close spatial association between the defences and other posthole alignments, which indicates that there were associated structures near the defences. Many other postholes were identified. Some posthole alignments away from the defences were associated with bedding trenches which supports their identification as related to dwellings or shelters. Posts also appear to be associated with oven scoops.

Stakeholes

Stakeholes were the most frequent feature encountered and they appear to be associated with charcoal lenses, hangi and sand/shell floors. This could indicate that the stones were first heated over the charcoal then transferred to the hangi, after which the rake-out was spread around. Stakehole alignments could represent associated structures, such as windbreaks and cooking shelters, with the shell/sand lens being spread as a working floor.

Other features

Drains were associated with postholes and open spaces, suggesting that they represented the border around living areas. Shell midden and garden soils were spatially separate from other features. This suggests that midden was initially dumped away from living areas, though it was often subsequently crushed when in use as an occupation floor. Gardens too, for obvious reasons, did not coincide with other features. The rest of the features only occurred once or twice and are therefore more difficult to assign.



		Ditch	Bank	Palisade	Post alignment	Scoop	Bedding trench	Pit	Stake alignment	Charcoal lens	Oven (stone)	Oven (charcoal)	Sand/shell floor	Drain	Open space	Shell midden	Garden	Burial	Obsidian conc.
DEFENCES	Ditch	3																	
	Bank	2	2																
	Palisade	1	1	4															
HOUSING	Post alignment	1	1	3	8														
	Scoop	-	-	-	3	3													
	Bedding trench	-	-	-	2	-	2												
STORAGE	Pit	-	-	-	1	-	1	1											
	Stake alignment	-	-	-	4	1	1	-	8										
COOKING	Charcoal lens	-	-	1	2	-	1	-	4	4									
	Oven (stone)	1	1	1	2	-	-	-	3	2	3								
	Oven (charcoal)	-	-	1	2	-	-	-	3	2	-	4							
	Sand/shell floor	-	-	-	1	-	1	-	1	2	-	1	3						
OTHER	Drain	-	-	1	2	-	-	-	2	1	-	1	1	3					
	Open space	-	-	1	1	-	-	-	1	-	-	-	-	2	2				
	Shell midden	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3			
	Garden	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	5		
	Burial	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	2	
	Obsidian conc.	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1

Fig. 15. Matrix showing the association of features.

DOCUMENTARY EVIDENCE

Documentary evidence exists in the form of local histories and the Maori Land Court Minute Books to provide a background to the history and environment of the Waiwhau site.

Waiwhau and the adjacent land blocks were claimed by various individuals during the late 19th and early 20th century. The Land Court Minute Books relate a series of events involving Waiwhau, its inhabitants and the surrounding area. The maps of the land blocks add details about the type of vegetation, names, landscape and watercourses that date to this period (Fig. 8).

Ngati Hako were the original owners of the land in the district. In the 17th century Ngati Tamatera began moving into Hauraki and there were many intermarriages (Kelly 1949). Individuals generally referred to their hapu (sub-tribe) affiliations and claimed association with either the Ngati Hako and/or Ngati Tamatera tribes. The main hapu in the region of Waiwhau were Kiriwera and Te Kiko (of Ngati Tamatera) and Te Uriwha (of Ngati Tamatera and Ngati Hako).

The date of the earliest occupation of Waiwhau is unknown, but may be inferred as the late 18th or early 19th century. The first traditional reference assigns the settlement to Te Pohepohe, a chief of the Kiriwera (then known as Kahuwhitiki). This was before the battle of the combined tribes at Komata against Te Horeta, chief of Ngati Whanaunga. Later some members of Te Uriwha hapu were buried on Waiwhau. At that time Te Popo had a large house built on the site in order to make peace with Ngaiterangi of Tauranga. Some time later the chief, Tarora, of the Ngati Tamatera, was buried at Waiwhau. Te Popo then left and Waiwhau became tapu. Subsequently the inhabitants of Raupa used Waiwhau as a burial ground (Tareranui *et al.* 1878).

All these events predated the first Ngapuhi incursion into the region in December 1821, which resulted in the sacking of Totara near Thames. Raupa was occupied at this time and a successful fight against the second Ngapuhi onslaught took place there. Subsequently much of the land was abandoned as the people fled inland in fear of Ngapuhi reprisals (Mataia 1893). The Ngapuhi incursion resulted in abandonment of the region for some eight years, when the Hauraki tribes went to the Waikato. However, they overstayed their welcome there, and a series of skirmishes ended in the battle of Haowhenua at Taumatawiwi when the Hauraki people were forced to return home (Kelly 1949).

When the people returned, Raupa was not resettled; however, the Puamanuka area (south of Waiwhau) was cultivated, and Waiwhau was again used as a burial ground by both Ngati Tamatera and Te Uriwha. Shortly afterwards Christianity was introduced to these groups.

According to Tareranui *et al.* (1878), following Taraia's attack on Ngaiterangi and battles between Ngati Hako and Ngati Haua in the Waikato, a pa called Opitau was built by Te Awhe, of Ngati Hako and Te Kiko, adjacent to Waiwhau (Fig. 8). This was occupied by the combined hapu of Te Kiko, Ngati Koe and Te Uriwha. Te Hira, chief of Ngati Hako, while living at Opitau made peace with Ngaiterangi and this was marked by a big feast there. A peace was also finally made with Ngati Haua in 1842-3 (Fenton 1879).

Nearby, was a noted eel weir called Moanakapiti. It was built by Pakitahi and Te Awhe, of Te Kiko and Te Uriwha, after the Ngapuhi invasion and kept in repair by their descendants (Te Pokiha *et al.* 1878). The physical features of a ditch and bank still defined the boundaries of Waiwhau when it came before the Maori Land Court in 1905 (Nicholls *et al.* 1905).

SOCIAL INTERACTION

Social interaction with other peoples can be inferred from the items imported to the site and from historical accounts.

Imports

Much of the organic material recovered could have originated on or near the site. However, marine fish and shellfish were undoubtedly transported from some estuarine source, the nearest being the Firth of Thames at the mouth of the Waihou River, 35 km downstream from Waiwhau, and could well represent items of trade (Fig. 16).

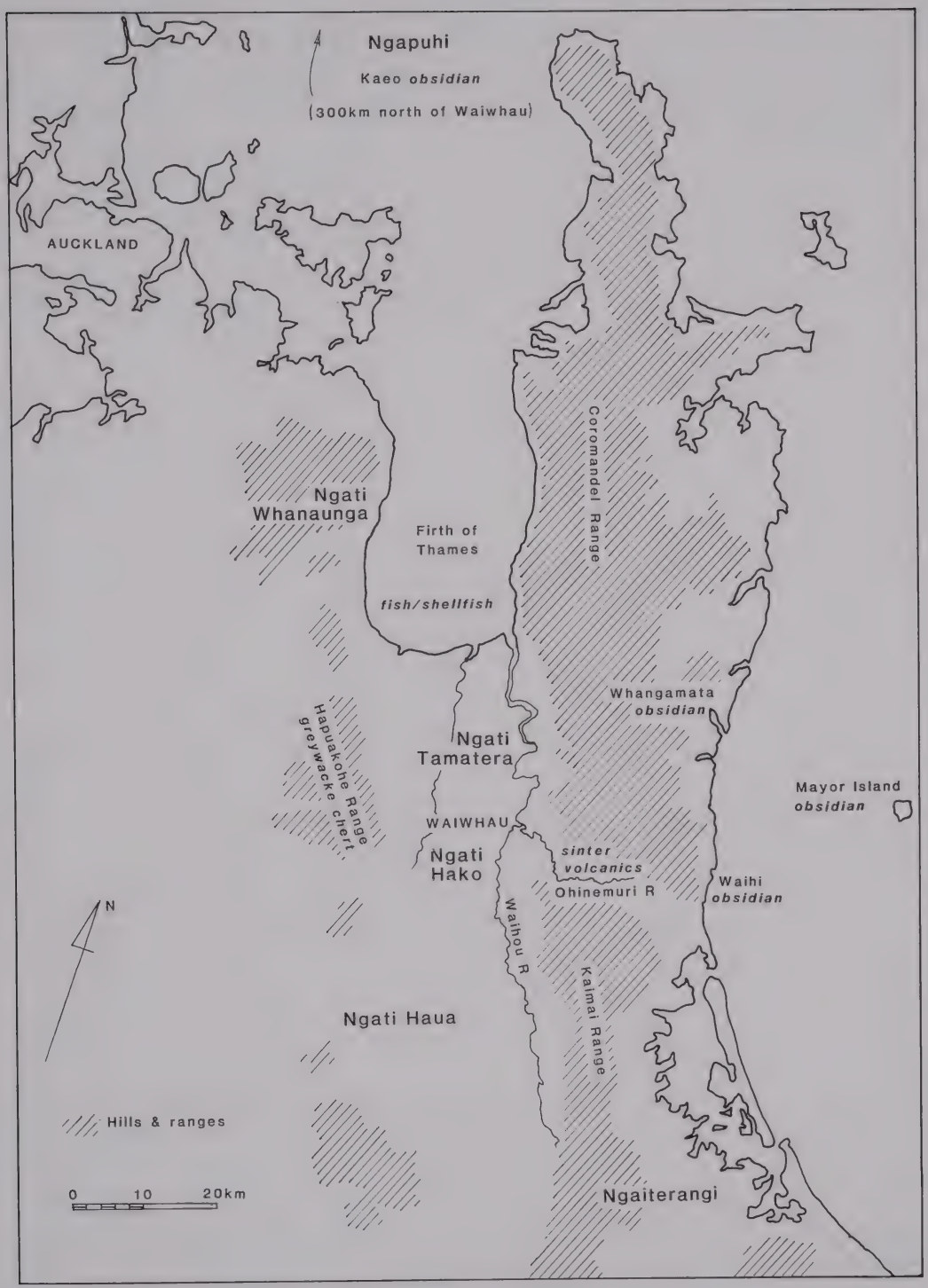


Fig. 16. Sources of stone and faunal remains found at Waiwhau, and location of tribal associations mentioned in the text.

Inorganic items included stone material and a variety of historic items. The stone came from a variety of localities, with obsidian originating from as far afield as Kaeo and Mayor Island. Clearly a much needed resource was the cooking stone which could have come from the upper reaches of the Ohinemuri. Other rock found on the site has been sourced to the southern Hunua Ranges and the Kaimai Ranges. All stone resources were imported and may be examples of trade. It is not clear whether any of the historic items were actually used by Waiwhau's inhabitants, since they all occurred in the disturbed upper layers. Some items such as nails, barbed wire fragments and shotgun pellets probably date to the time when Waiwhau was brought into pasture.

Historical accounts

The Maori Land Court records document wars with Ngati Whanaunga of the Firth of Thames, Ngaiterangi of Tauranga, Ngapuhi from Northland and Ngati Haua of Waikato. These battles and reconciliations all occurred in the first half of the 19th century, so it seems the inhabitants of Waiwhau had contact with a wide variety of tribes. Historical accounts also document individual warriors joining other taua (war parties) throughout the North Island.

The burials of both Ngati Hako and Ngati Tamatera at Waiwhau indicate a degree of contact between these two tribes though it is stressed that this only occurred after the introduction of Christianity. In addition, the genealogies cited in the Maori Land Court hearing suggest that there was much intermarriage between the two. Marriages also occurred with more distant tribes.

The evidence from the archaeological remains, together with historical accounts of warfare, marriage and burial suggest very strongly that in the early 19th century, at least, the inhabitants of Waiwhau had direct contacts with people up to several hundred kilometres away.

CONCLUSIONS

Waiwhau was constructed on levees at the confluence of the two major rivers draining the eastern Hauraki Plains. This location, at the junction of important routes up the Waihou to the Waikato, up the Ohinemuri and over the ranges to the Bay of Plenty, and downstream to the Firth of Thames, would naturally attract settlement. The area was rich in resources and included a variety of ecological zones.

Waiwhau was on slightly higher ground than the neighbouring pa of Raupa and less prone to flooding. However, whereas the soils at Raupa were well-drained sandy loams, the Waiwhau soils were less well drained silty clays. The lack of large underground storage pits at Waiwhau and the positioning of the gardens on sloping land probably reflect this fact. The soils would also have made Waiwhau unsuitable for occupation based on kumara agriculture. This may explain the apparently short occupation of the site, which may have only been utilised after the introduction of the white potato at the end of the 18th century.

The initial phases of settlement involved scattered occupation and probably included gardening. Subsequently Waiwhau was made into a pa, presumably because

of threat of attack. In the same way that Opitau was constructed in expectation of attack from Ngaiterangi, Waiwhau may have been defended in response to attacks from Ngati Whanaunga in the very early years of the 19th century. Small scale occupation and gardening continued during the defended phase. It is notable that the defended area of Waiwhau at some 5,000 m^2 was less than half the area of Raupa's internal defences and only a quarter the size of Raupa at its fullest extent. Waiwhau was also considerably smaller than the later Opitau at approximately 17,000 m^2.

After a short period the palisades were probably removed and may have been used to refortify Raupa. Marsden, visiting Raupa in 1820, made no mention of a nearby pa; however, the ditch and bank were still visible in 1905 (they finally became obscured by flood debris and ploughing in the 1930s). Raupa's defences were also removed after abandonment, possibly to fortify the later pa of Opitau. In the last phases of Waiwhau's occupation there is evidence of obsidian working as well as small scale habitation and gardening. Historically it is recorded that Te Popo built a house on Waiwhau in order to make peace with Ngaiterangi; it is possible that this occurred when the site was still fortified.

Subsequently the site was abandoned, as is indicated by soil formation and driftwood. At this time burials were deposited within the defended zone. This corresponds with the Land Court account that when Tarora was buried there the site was abandoned and it then became a burial ground for the inhabitants of Raupa and the surrounding area. The three burials in Area 4 were probably Christian. The Land Court Records state that burials were conducted on the site both before and after conversion to Christianity. Some ten named individuals are recorded as being buried at Waiwhau, but it is not known if any of these refer to the graves found.

The dispersed nature of occupation and scanty debris in comparison to Raupa, suggest that Waiwhau was occupied for a much shorter period. It was probably an open gardening settlement for most of its existence, only briefly defended, possibly by Te Kiriwera, very early in the 19th century.

While the occupation at Waiwhau may have begun with the introduction of European potatoes *ca.* 1790, it ended with the later introduction of pigs into the area *ca.* 1810. The few European artefacts found at Waiwhau were all from the disturbed top layer, and are suspected of having been incorporated into the occupation layers by the later ploughing event. This observation is in comparison to the handful of European artefacts found in the Raupa deposits, suggesting that Waiwhau was abandoned both before European goods were readily available (*ca.* 1815) and also before the latest occupation of Raupa. This is supported by the traditional records cited in the Maori Land Court, and by the lack of any mention of it in 1820 when Marsden visited Raupa.

Flatland pa are a feature of the Hauraki Plains landscape, and are often situated in the bends of the major rivers (Best 1980). The pa appear to be grouped: so that a large defensive site, which possibly acted as a major focal point for the community and was occupied for some time, is associated with smaller satellite pa, possibly occupied by related hapu, and occupied for a shorter period. Raupa was probably one of the large focal pa in the region, while Waiwhau is an example of the latter. The extent to

which this pattern was a product of 19th century warfare and economy on the Hauraki Plains is unknown. However, it is known elsewhere in New Zealand prehistory (Gorbey 1970; Irwin 1985:101-9) and may have a prehistoric basis in the Hauraki Plains also.

This work has integrated formerly well known oral history about Waiwhau with its previously obscure physical remains in a way that now makes the site part of the permanent record of late Maori settlement in the Paeroa district.

As a postscript, it can be added that owing to the discovery of burials at Waiwhau and Raupa, both sites are now seen as wahitapu by the Ngati Tamatera and all flood control measures planned by the Hauraki Catchment Board, which would have destroyed what remains of the sites, have ceased.

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Our thanks go to all the participants — tutors Rod Wallace and Liz Hudson, and students: Aaron Eastmure, Matthew Felgate, Anita Gutschlag, Anna Lee, Donna Nash, Jill O'Brien, Lynn Steedman, and Bonita Sutherland. All played a role not only in excavation but also in the analysis, research and writing of reports on this material as part of their University course; other students Joan Lawrence and Rosemary Jephcote also took part in the excavation.

Thanks go to the Ngati Tamatera for their hospitality in enabling us to stay at the Te Pai-o-Hauraki marae. Our koha to our hosts is in bringing to light the history of an almost forgotten settlement of theirs, which can again take its rightful place as a wahitapu.

Several individuals helped in the production of this paper. Phil Moore assisted in identifying the obsidian. Rod Wallace identified the charcoal samples. Reg Nichol assisted in the identification of the midden material. Ian Smith provided secure identifications of the mammal bone, and Foss Leach of the fishbone. Jan Coates discussed the soils. Caroline Phillips drew the illustrations. The authors, who throughout contributed to the interpretive framework, bear the responsibility for the final version adopted here.

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APPENDIX 1. List of wood, fruit stones and charcoal samples.

Samples 20, 36 and 29 were from Area 4i, samples 25, 52, 95, 104, 114 and 126 were from Area 4ii, and samples 9, 21 and 93 were from Area 4iii.

The majority of identified samples were charcoal fragments; other samples were wood, in the form of root material (r), degraded wood fragments (w), or post remains (p); there were also charred fruit stones (s).

Occupation phase	2	4				5				6		7
Sample number	93	95	104	114	126	25	36	52	129	9	21	20
Swamp forest												
Dacrycarpus dacrydioides	.	.	.	.	.	.	.	.	.	.	.	2r
Podocarpus sp.	.	.	.	.	.	.	.	.	.	.	2	.
Lowland forest trees												
Phyllocladus trichomanoides	.	2w	.	.	.	.	.	.	.	.	.	.
Beilschmiedia tawa	.	1s	.	.	?s	.	1	3	.	.	.	.
Metrosideros robusta	.	.	.	.	.	.	.	.	.	.	7	.
conifer	.	.	.	3p	.	.	.	.	.	.	.	.
Prumnopitys taxifolia	.	7w	.	.	.	1w	2	1	1p	.	.	.
Pittosporum sp.	.	.	.	.	.	.	1	1	.	.	.	.
Lowland forest trees and shrubs												
Vitex lucens	.	.	.	.	.	.	.	.	.	2	.	.
Elaeocarpus dentatus	.	.	1s	.	.	.	.	.	.	.	.	.
Corynocarpus laevigatus	1s	.	.	.	.	.	.	.	.	.	.	.
Litsea calicaris	.	.	.	.	.	.	.	.	.	.	1	.
Hedycarya arborea	.	.	.	.	.	.	.	.	.	1	.	.
Pseudopanax edgerleyi	.	.	.	.	.	.	.	.	.	1	.	.
Melicytus ramiflorus	.	.	.	.	.	.	1	.	.	.	1	.
Pseudopanax arboreus	.	.	.	.	.	.	.	.	.	.	1	.
Hebe sp.	.	.	.	.	.	.	1	.	.	.	.	.
Lophomyrtus bullata	.	7w	.	.	.	.	6	.	.	5	6	.
Leptospermum scoparium	.	.	.	.	.	.	3	.	.	11	3	.
Myrsine divaricata	.	.	.	.	.	.	4	.	.	.	2	.
Ferns and herbs												
Cyathea sp.	.	.	.	.	.	.	1	.	.	.	.	.
Coprosma sp.	.	.	.	.	.	.	.	1		3	2	.

APPENDIX 2. Shellfish identifications.

Total sample weight 2800-3900 g, comprising an average of 8% shell, 3% stone, 1% charcoal and 88% soil. Samples 17, 18 and 19 were from Area 4i, and samples 58 and 59 were from Area 4iii. Numbers = numbers of individuals per samples.

	Phase 4			Phase 5	
Sample number	58	59	17	18	19
Paphies australis	68	84	89	79	72
Chione stutchburyi	11	10	11	9	4
Cominella glandiformis	.	.	1	.	.
Mactra ovata	.	.	1	.	.
gastropod	.	.	.	.	1

APPENDIX 3. Fish, bird and mammal identifications.

All bone specimens were collected by hand separately and were not part of midden samples. Samples are tabled according to the phase and the location of Area 4 in which they occurred. Numbers = number of bone fragments collected.

Area 4	Phase 2 (iii)	Phase 4 (i)	Phase 4 (ii)	Phase 4 (iii)	Phase 5 (i)	Phase 5 (ii)	Phase 5 (iii)	Phase 6 (iii)
Fish[1]								
Snapper	.	.	.	1	.	1	.	.
Elasmobranch	.	1	.	.	.	.	.	.
Unidentified	2	1	4	3	1	25	.	2
Bird								
Unidentified	.	1	1	2	.	4	.	.
Mammal								
Dog	1	1	8	3	2	1	.	.
Pig[2]	.	.	?	.	.	.	.	.
Unidentified	1	.	1	.	1	2	.	.

[1] The fishbone assemblage mainly consists of vertebrae and spines; only three bones are identifiable (pers. comm. Foss Leach).

[2] Possible pig radius, not a positive identification (pers. comm. Ian Smith).

LICHENS OF LITTLE BARRIER ISLAND (HAUTURU), NORTHERN NEW ZEALAND

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Abstract. Two hundred and fifty-one lichen species from 96 genera are recorded from Little Barrier Island, northern New Zealand. This represents about 20% of the present total of known lichens in the New Zealand flora and this richness reflects the diversity of largely unmodified natural vegetation types and habitats on the island. These Little Barrier records include the second New Zealand records of *Arthonia tumidula, Calicium robustellum, Dimerella zonata, Hypotrachyna immaculata* and *Lopadium monosporum* (endemic); and the most northerly records in New Zealand of a further 20 species.

In tandem with the vascular vegetation, the lichen flora shows a rough zonation with increasing altitude. *Verrucaria maura* and *Lichina confinis* are restricted to intertidal rocks. The flora of maritime rocks just above high tide is dominated by *Buellia, Lecidea, Pertusaria, Rimelia, Parmotrema, Heterodermia, Xanthoparmelia, Neofuscelia, Pannaria elatior* and *Ramalina.*

Coastal scrub has a characteristic association of yellow *Xanthoria* and *Caloplaca*, grey *Physcia caesia* and crustose *Opegrapha intertexta.* Coastal pohutukawa forest lichens are dominated by *Hypotrachyna, Parmelinopsis, Parmotrema, Rimelia* and *Usnea inermis.*

Kanuka and kanuka-mixed forest below about 300 m have rich lichen floras dominated by many *Pseudocyphellaria* (especially *P. carpoloma, P. montagnei* and *P. coriacea*), *Psoroma, Sticta latifrons, Coccocarpia, Heterodermia* and *Pannaria.* Ground dwelling lichens beneath the kanuka forest are mainly *Cladina confusa, Cladia aggregata, Stereocaulon ramulosum*, and many *Cladonia.*

Kauri and mixed forest types between 200 and 500 m have epiphytic floras dominated by *Pseudocyphellaria glabra, P. multifida, Psoroma, Heterodermia, Menegazzia, Megalospora* and *Megalaria grossa*, with *Metus conglomeratus* and *Pseudocyphellaria dissimilis* common on the forest floor.

Lichens in the high humidity mixed forest and scrub above 500 m are dominated by *Sticta filix* with subdominant *Pseudocyphellaria multifida, P. faveolata, P. glabra, P. coronata, Sphaerophorus melanocarpus* and *Cladia aggregata. Sphaerophorus tener, Siphula decumbens* and *Phaeographis exaltata* are abundant above about 650 m.

Rec. Auckland Inst. Mus. 28: 185-199 20 December 1991

The lichens recorded here were collected and studied by the authors during a 7 day visit to Little Barrier Island by the Offshore Islands Research Group in May 1990 and by BWH during an 8 day visit by the Auckland University Field Club in August 1981.

Little Barrier Island (latitude 36°12′S, longitude 175°07′E) is a large Nature Reserve (2 817 hectares) lying at the entrance to the Hauraki Gulf, midway between Great Barrier Island and Northland (Fig. 1), and 80 km north of Auckland. The island is a partly eroded, Pleistocene, andesite stratovolcano (Kear 1961). Its coastline has

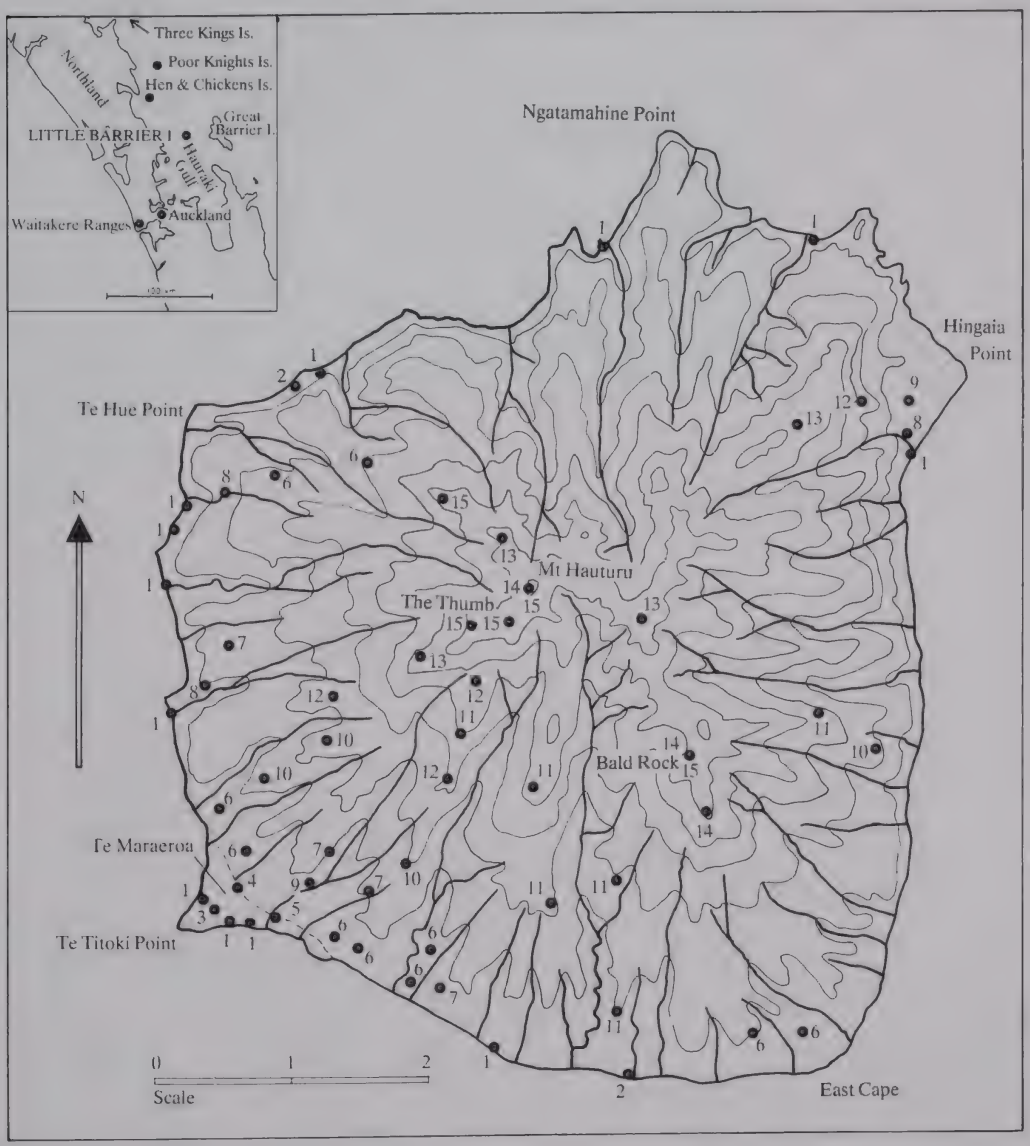

Fig. 1. Main localities where lichens were collected on Little Barrier Island. Numbers refer to habitat codes in species list.

eroded back in the soft laharic breccias to form sheer cliffs, up to 300 m high. Its lower ridges (below 300 m) preserve the original gentle slopes of the laharic ring plain cut by a radial pattern of deeply incised streams. The original central cone has been extensively eroded and now consists of a group of steep central peaks, the highest of which (Hauturu) is 722 m above sea level. The low-lying, flat land forming Te Maraeroa on the southwest corner is formed by the convergence of two boulder banks, created by opposing wave systems.

Rainfall is spread throughout the year with an annual mean of 1550 mm at sea level and considerably greater at higher altitudes. The mean number of days per year having at least 0.1 mm of rain is close to 200. Hence Little Barrier has a rich lichen flora.

Little Barrier has one of the largest forested areas in New Zealand that has not been modified by mammalian herbivores. The steep, central, higher parts of the island are clothed in near virgin forest, ranging from patches of subalpine scrub on the peaks to mixtures of southern rata (*Metrosideros umbellata*), tawaroa (*Beilschmiedia tawaroa*), hard beech (*Nothofagus truncata*) and kauri (*Agathis australis*) on the slopes. Much of the lower slopes (below 300 m) was cleared or burnt in prehistoric and early European times (Hayward 1982) and is presently covered in regenerating kanuka (*Kunzea ericoides*) and kanuka-mixed forest. Mature mixed broadleaf forest still occupies most of the incised stream valleys and ravines all the way to the coast. Te Maraeroa flat is currently grazed grassland with scattered clumps of mature kanuka, a small orchard and groves of coastal pohutukawa (*Metrosideros excelsa*).

There has been no previous work on the lichens of Little Barrier Island, apart from a few isolated specimens collected over the years by botanists studying the higher plants. The vegetation of the island and its altitudinal zonation has been described by Hamilton and Atkinson (1961). In this study, representative lichen collections and observations were made in all the main habitats. Every endeavour was also made to obtain a full lichen species list for the island.

SPECIES LIST

The right hand column refers to voucher specimens of those lichens which are lodged in the herbaria of the Auckland Institute and Museum (AK), or the National Museum, Wellington (WELT).

Habitats (Fig. 1)

1 marine and maritime
2 coastal scrub
3 coastal pohutukawa
4 grassland (below 20 m)
5 orchard trees
6 mature kanuka forest
7 kanuka-mixed forest
8 open stream beds
9 mixed broadleaf forest (below 250 m)
10 kauri forest
11 kauri-beech forest
12 mixed forest (250-500 m)
13 mixed forest (above 500 m)
14 open rocky bluffs (above 500 m)
15 subalpine scrub

Substrates

b = bark
ch = charcoal
d = decaying logs
l = leaf
m = moss
p = fern
r = rock
s = soil

Arthonia tumidula (Ach.) Ach.	b5	AK203196
Arthonia sp.	b3	AK203197
Arthothelium fusconigrum (Nyl.) Mull. Arg.	b11	AK203277
Bacidia albidoplumbea (J. D. Hook. & Taylor) Hellbom	b4,b7,b15	AK203166
Bacidia buchananii (Stirton) Hellbom	m7,m8,mr9	AK193398
Bacidia aff. *subcerina* Zahlbr.	r1	
Baeomyces absolutus Tuck.	s7	AK174619
Baeomyces arcuatus Stirton	s6	
Baeomyces heteromorphus Nyl. ex Church. Bab. & Mitten	ds6,r15	AK193406
Brigantiaea chrysosticta (J. D. Hook. & Taylor) Hafellner & Bellemere	b7,b12	AK203278
Brigantiaea tabacodes (Zahlbr.) Hafellner	b6,m7,m9,b10,b11,b12,m13	AK193428
Buellia nitrophila Zahlbr.	r1	AK203165
Buellia punctata (Hoffm.) Massal.	b3,b11,r15	
Buellia stellulata (Taylor) Mudd	r1	AK203201
Byssoloma subdiscordans (Nyl.) P. James	p12	AK203164
Calicium hyperelloides Nyl.	d1	AK193448
Calicium robustellatum Nyl.	d1	
Calicium tricolor F. Wilson	d1	AK203333
Caloplaca holocarpa (Hoffm.) Wade	r1	
Caloplaca inclinans (Stirton) Hellbom	b2	AK193562
Caloplaca litoralis Zahlbr.	r1	AK203163
Candelariella vitellina (Ach.) Mull. Arg.	r1	
Catapyrenium cinereum (Pers.) Korber	r1	AK193372
Catillaria kelica (Stirton) Zahlbr.	b11	AK161806
Chrysothrix candelaris (L.) Laundon	b3	AK193494
Cladia aggregata (Sw.) Nyl.	s6,ms15	AK162149
Cladia retipora (Labill.) Nyl.	s6,s14	AK193537
Cladia sullivanii (Mull. Arg.) W. Martin	r14	AK193533
Cladina confusa (R. Sant.) Follmann & Ahti	s6,s15	AK160408
Cladonia bacillaris Nyl.	d4	
Cladonia capitellata (J. D. Hook. & Taylor) Church. Bab.	s6,s14,s15	AK154458
Cladonia cervicornis subsp. *verticillata* (Hoffm.) Ahti	s1	AK174609
Cladonia chlorophaea (Floerke ex Sommerf.) Sprengel	s6,s15	AK174610
Cladonia corniculata Ahti & Kashiwadani	s11	AK203162
Cladonia cornuta (L.) Hoffm.	s15	AK203161
Cladonia crispata (Ach.) Flotow	s15	AK203160
Cladonia enantia Nyl.	s6	
Cladonia fimbriata (L.) Fr.	s1,s6,s14,s15	AK174613
Cladonia floerkeana (Fr.) Floerke	ds1,r4,s6,s14	AK174560
Cladonia furcata (Huds.) Schrader	s6	AK203159
Cladonia gracilis subsp. *tenerrima* Ahti	s6	
Cladonia ochrochlora Floerke	d1,ds6	AK174564
Cladonia polycarpoides Nyl. ex Gasilien	s6	
Cladonia praetermissa A. W. Archer	s11,s12,s13	AK203158
Cladonia pyxidata (L.) Hoffm.	d1	AK193452
Cladonia ramulosa (With.) Laundon	s1,b11,s15	AK174607
Cladonia scabriuscula (Delise) Leighton	s13,bs15	AK154751
Cladonia squamosa (Scop.) Hoffm.	b1	
Cladonia squamosula Mull. Arg.	d1,s11	AK203177
Cladonia sulcata A. W. Archer	s1	AK203176
Clathroporina exocha (Nyl.) Mull. Arg.	r1,b2,r7,b9	AK174570
Coccocarpia erythroxyli (Sprengel) Swinsc. & Krog	b6,b11,b15	AK154634

Coccocarpia palmicola (Sprengel) Arvidsson & D. Galloway	b3,b6,b11	AK193485
Coccocarpia pellita (Ach.) Mull. Arg. emend. R. Sant.	b4,b6	AK174580
Coccotrema cucurbitula (Mont.) Mull. Arg.	b13,b15	AK203175
Coenogonium implexum Nyl.	b3,b4	AK174584
Collema fasciculare (L.) Wiggers	b6,b10	AK193555
Collema laeve J. D. Hook. & Taylor	b4,b5,b6	AK160382
Collema subconveniens Nyl.	r1,r8	AK193378
Collema subflaccidum Degelius	b4,b5,b10	AK174591
Dendriscocaulon dendriothamnodes Dughi in D. Galloway	l13	
Dimerella lutea (Dickson) Trevisan	b6,l13	AK175109
Dimerella zonata (Mull. Arg.) R. Sant.	p15	AK203174
Diploicia canescens (Dickson) Massal.	r1,r3	AK193361
Dirinaria picta (Sw.) Clem. & Shear	b3	AK193581
Enterographa bella R. Sant.	l12	
Erioderma sorediatum D. Galloway & P. M. Jorg.	b6,b11	AK193554
Flavoparmelia soredians (Nyl.) Hale	r3,b5,b6	AK193447
Graphina monospora (Knight) Mull. Arg.	b6	
Graphina novae-zelandiae (Knight) G. Hayward	r1	AK193360
Graphis librata Knight	b11,b12	AK169706
Heterodermia isidiophora (Nyl.) Awasthi	r8	AK193569
Heterodermia japonica (Sato) Swinsc. & Krog	r1,br3,b6,b7,r8,b11,b13	AK193364
Heterodermia leucomelos subsp. *boryi* (Fee) Swinsc. & Krog	b11,b12,r15	AK193499
Heterodermia microphylla (Kurok.) Swinsc. & Krog	r1,r2,b6,b7,b11	AK193513
Heterodermia obscurata (Nyl.) Trevisan	rs1,r2,bs6,r12	AK193497
Heterodermia speciosa (Wulfen) Trevisan	r1,r9	AK193379
Hypogymnia subphysodes (Krempelh.) Filson	b15,r14	AK175176
Hypotrachyna immaculata (Kurokawa) Hale	b3	AK176076
Hypotrachyna osseoalba (Vain.) Park & Hale	b3,r14	AK172389
Hypotrachyna revoluta (Floerke) Hale	n4	AK203198
Laurera elatior (Stirton) D. Galloway	b6,b7,b11	AK193551
Lecanactis redingeri Zahlbr.	b4	WELT L3218
Lecanora campestris (Schaerer) Hue	r1	AK203194
Lecanora chlarotera Nyl.	b3	AK193385
Lecanora symmicta (Ach.) Ach.	b3	
Lecidea cerinocarpa Knight	b4	AK193451
Lecidea conisalea Knight	b6	AK203173
Lecidea laeta Stirton	b2	AK193564
Lecidea gallinarum Zahlbr.	r1	AK203172
Lecidea cf. *subcoarctata* Knight	r1	
Lecidea spp.	r1,r14	AK154407 AK157386
Leioderma duplicatum (Mull. Arg.) D. Galloway & P. M. Jorg.	b6,b11	
Leioderma sorediatum D. Galloway & P. M. Jorg.	b15	AK203279
Lepraria incana (L.) Ach.	rs1,b3,b12	AK193370
Leptogium azureum (Sw.) Mont.	b2,b4	
Leptogium coralloideum (Mey. & Flot.) Vainio	b4,b5,b10,b12	AK175192
Leptogium crispatellum Nyl.	b4,b6,l15	AK175195
Leptogium cyanescens (Rabenh.) Korber	r1,b4,b5,b6,r7,b11.b12	AK175201
Lichina confinis (O. F. Muller) Agardh	r1	
Lopadium monosporum (Knight) Hellbom	b6	AK193443
Megalaria grossa (Pers. ex. Nyl.) Hafellner	b3,b4,b6,b7,b11,b12,b15	AK203170

Megaloblastenia flavidoatra (Nyl.) Sipman	b3,b6,b11	AK193489
Megaloblastenia marginiflexa (J. D. Hook. & Tayl.) Sipman	b3	AK203169
Megalospora bartlettii Sipman	b12	AK193530
Megalospora campylospora (Stirton) Sipman	b12	
Megalospora gompholoma (Mull. Arg.) Sipman	b6,bm11,b12	AK193559
Megalospora knightii Sipman	br7,r9,b10,b12,b13	AK193516
Melaspilea subeffigurans (Nyl.) Mull. Arg.	b5	AK175218
Menegazzia aucklandica (Zahlbr.) P. James & D. Galloway	b10	AK203280
Menegazzia circumsorediata R. Sant.	b7,b10,b11,b15	AK193539
Menegazzia eperforata P. James & D. Galloway	b10	AK193558
Menegazzia nothofagi (Zahlbr.) P. James & D. Galloway	b11,b12,l13,r14,b15	AK175221
Metus conglomeratus (F. Wilson) D. Galloway & P. James	s10,s11,ms13	AK193436
Miltidea ceroplasta (Church. Bab.) D. Galloway & Hafellner	b11,b12,b15	AK176038
Neofuscelia pulla (Ach.) Esslinger	r1	AK161859
Neofuscelia verrucella (Esslinger)Esslinger	r1	AK203205
Neophyllis melacarpa (F. Wilson) F. Wilson	b3,b11	AK162157
Nephroma plumbeum (Mont.) Mont.	bm15	AK193428
Ochrolechia parella (L.) Massal.	r1	AK203168
Opegrapha agelaeoides Nyl.	b3,b5,b6	AK193491
Opegrapha devia (Knight & Mitten) Nyl.	b6	
Opegrapha diaphoriza Nyl.	r1	AK169701
Opegrapha intertexta Knight	b2,b3,b4,b6,b8,b11	AK193501
Pannaria crenulata P. M. Jorg.	r9,b13,b12	AK193540
Pannaria elatior Stirton in Bailey	r1,b3,b4,bs6,r8	AK193380
Pannaria fulvescens (Mont.) Nyl.	bs6,b7,m12,b13	AK161265
Pannaria gemmascens Nyl.	b6	
Pannaria immixta Nyl.	b5,b6,b11,b15	AK193486
Pannaria subimmixta Knight	r3,s6,r7	AK193389
Parmelia erumpens Kurok.	dr1,b3,b6	AK172452
Parmelia saxatilis (L.) Ach.	r1	AK203167
Parmelia sulcata Taylor	r1	AK193369
Parmelia testacea Stirton	b4,b6,b11,b12	AK193561
Parmeliella nigrocincta (Mont.) Mull. Arg.	d9,b12	AK203204
Parmelinopsis jamesii (Hale) Elix & Hale	d1,b3	AK193579
Parmelinopsis cf. *jamesii* (Hale) Elix & Hale	b3	
Parmelinopsis spumosa (Asahina) Elix & Hale	b3,b4	AK175309
Parmelinopsis subfatiscens (Kurok.) Elix & Hale	b6	
Parmotrema arnoldii (Du Rietz) Hale	r1,r14,b15	AK193538
Parmotrema chinense (Osbeck) Hale & Ahti	br1,b3,b11,r14	AK175334
Parmotrema crinitum (Ach.) M. Choisy	b1,br3,br4,b6	AK162161
Parmotrema mellissii (Dodge) Hale	r8,r14	AK162160
Parmotrema subtinctorum (Zahlbr.) Hale	r1	AK193512
Parmotrema tinctorum (Nyl.) Hale	r1,br3	AK175358
Peltigera dolichorhiza (Nyl.) Nyl	s6,s15	AK162151
Peltigera nana Vainio	s15	AK193427
Peltigera ulcerata Mull. Arg.	s13	AK193541
Pertusaria aff. *amaurospora* Hellbom	r1	AK202460
Pertusaria dactylina (Ach.) Nyl.	s14	AK203191
Pertusaria lavata Mull. Arg.	r1,r8	AK175366
Pertusaria sorodes Stirton	b3	AK193510
Pertusaria aff. *theochroa* Krempelh.	r1	AK203193

Phaeographis australiensis Mull. Arg.	b5,b12	AK169704
Phaeographis exaltata (Mont. & v. d. Bosch) Mull. Arg.	b15	AK175376
Phaeographis inusta (Ach.) Mull. Arg.	b12	AK203190
Phyllopsora microdactyla (Knight) D. Galloway	b2,b6	AK203189
Physcia caesia (Hoffm.) Furnr.	r1,b2,b5	AK193502
Physcia tribacioides Nyl.	r1,r3,b6	AK193504
Physconia enteroxantha (Nyl.) Poelt	b3	AK193580
Placopsis parellina f. *argillacea* (Knight) Lamb	s1	AK202679
Poeltiaria turgescens (Korber) Hertel	r1	AK203188
Polychidium contortum Henssen	b6,b13,b15	AK193434
Porpidia albocaerulescens (Wulfen) Hertel & Knoph	r1,r14	AK203187
Porpidia sp.	r1	AK203203
Pseudocyphellaria aurata (Ach.) Vainio	r1,b4,b9	AK160637
Pseudocyphellaria carpoloma (Delise) Vainio	b6	AK162139
Pseudocyphellaria chloroleuca (J. D. Hook. & Taylor) Du Rietz	b12	AK161579
Pseudocyphellaria cinnamomea (A. Rich.) Vainio	r7,r9,r12,r13	AK193459
Pseudocyphellaria coriacea (J. D. Hook. & Taylor) D. Galloway & P. James	r1,b6,b12	AK162146
Pseudocyphellaria coronata (Mull. Arg.) Malme	b3,b6,b12,b13,b15	AK193401
Pseudocyphellaria crocata (L.) Vainio	r1,bs6	AK161503
Pseudocyphellaria dissimilis (Nyl.) D. Galloway & P. James	s6,s7,r9,b10,b12	AK154882
Pseudocyphellaria episticta (Nyl.) Vainio	b4,b6	AK161535
Pseudocyphellaria faveolata (Delise) Malme	b11,b13,bl15	AK181647
Pseudocyphellaria fimbriatoides D. Galloway & P. James	r8,r9	AK203281
Pseudocyphellaria glabra (J. D. Hook. & Taylor) Dodge	b10,b12,b13,b15	AK162145
Pseudocyphellaria granulata (Church. Bab.) Malme	b4	
Pseudocyphellaria haywardiorum D. Galloway	b4	AK203186
Pseudocyphellaria intricata (Delise) Vainio	bd6,b15	AK203283
Pseudocyphellaria knightii D. Galloway	r1	
Pseudocyphellaria lividofusca (Krempelh.) D. Galloway & P. James	b7,b12,b13,b15	AK193442
Pseudocyphellaria montagnei (Church. Bab.) D. Galloway & P. James	b6	AK162140
Pseudocyphellaria multifida (Nyl.) D. Galloway & P. James	b6,b9,b10,b11,b12,b13,b15	AK193431
Pseudocyphellaria pickeringii (Tuck.) D. Galloway	r1,b3,b4,b6,bd7	AK160259
Pseudocyphellaria poculifera (Mull. Arg.)D. Galloway & P. James	b3	AK203284
Pseudocyphellaria rubella (J. D. Hook. & Taylor) D. Galloway & P. James	b15	AK193420
Pseudocyphellaria rufovirescens (Church. Bab.) D. Galloway	b7,b13	AK193462
Pseudocyphellaria wilkinsii D. Galloway	b7	AK203285
Psoroma allorhizum (Nyl.) Hue	r1,b3,b6,b11,b12,bl13	AK193488
Psoroma araneosum (Church. Bab.) Nyl.	b6,d8	AK203286
Psoroma asperellum Nyl.	b11	
Psoroma athroophyllum Stirton	b6,b7,b11	AK203287
Psoroma implexum Stirton	b6,b7,b11,b12	AK193479
Psoroma leprolomum (Nyl.) Rasanen	b11,b15	AK203288
Psoroma microphyllizans (Nyl.) D. Galloway	r1,b6,l13	AK193442
Psoroma sphinctrinum (Mont.) Nyl.	b10,b12	AK193519
Psoroma xanthomelanum Nyl.	b15	AK193426
Psoromidium aleuroides (Stirton) D. Galloway	b11,b13,b15	AK202686

Punctelia borreri (Sm.) Krog	b5	AK176087
Pyrenula deliquescens (Knight) Mull. Arg.	b6,b7,b11	AK203184
Ramalina australiensis Nyl.	r1,r3	AK173649
Ramalina celastri (Sprengel) Krog & Swinscow	r1,r3,r4	AK102098
Ramonia sp.	b6	AK162195
Rhizocarpon geographicum (L.) DC	r1	
Rimelia cetrata (Ach.) Hale & Fletcher	r1,b3,s9,r14	AK171695
Rimelia reticulata (Taylor) Hale & Fletcher	r1,b3,b6,b11,r14	AK160196
Rinodina tubulata (Knight) Zahlbr.	r1	AK203183
Roccellinastrum neglectum Henssen & Vobis	b12,b13	AK193403
Schismatomma sp.	b7	AK193532
Siphula decumbens Nyl.	bs13,s15	AK193547
Siphula ramalinoides Nyl. ex Crombie	r14	AK173633
Sphaerophorus insignis Laurer	b6,b12	AK203289
Sphaerophorus melanocarpus (Sw.) DC.	b13,m15	AK193417
Sphaerophorus patagonicus (Dodge) Ohlsson	b12,b13,b15	AK173639
Sphaerophorus tener Laurer	b13,bm15	AK203290
Stereocaulon ramulosum Rauschel	r1,s6,r14,rs15	AK160561
Stereocaulon vesuvianum Pers.	r14	AK173604
Sticta cinereoglauca J. D. Hook. & Taylor	b7	
Sticta filix (Sw.) Nyl.	b12,b13,l15	AK161400
Sticta fuliginosa (Hoffm.) Ach.	b4,b5,r15	AK160396
Sticta lacera (J. D. Hook. & Taylor) Mull. Arg.	b12,b13	AK193402
Sticta latifrons A. Rich.	b3,b6,b7,b10	AK154810
Sticta squamata D. Galloway	r1,b3,b4,b6	AK154765
Sticta subcaperata (Nyl.) Nyl.	b3,b4,bs6,b7,b12,b13	AK162141
Strigula elegans (Fee) Mull. Arg.	l7	AK173618
Teloschistes chrysophthalmus (L.) Th. Fr.	b2	AK203291
Teloschistes flavicans (Sw.) Norman	b12	AK173622
Teloschistes xanthorioides J. Murray	b5	AK193576
Tephromela atra (Huds.) Hafellner in Kalb	r1,b5	AK175183
Thelotrema lepadinum (Ach.) Ach.	b3,b5,b6,r8	AK173624
Thysanothecium scutellatum (Fr.) D. Galloway	ch1	AK193449
Trapelia coarctata (Turner) M. Choisy	r6, r9,r11	AK193392
Trapeliopsis congregans (Zahlbr.) Brako	b2	
Trapeliopsis granulosa (Hoffm.) Lumbsch	r12	AK203182
Usnea arida Mot.	b5,b12,b15	
Usnea inermis Mot.	b3,b5,b6,b13	AK173594
Usnea molliuscula Stirton	b3,b5,b11	AK193578
Usnea rubicunda Stirton	r14,b15	AK203178
Verrucaria maura Wahlenb. ex Ach.	r1	
Xanthoparmelia australasica D. Galloway	r1	AK173597
Xanthoparmelia flavescentireagens (Gyelnik) D. Galloway	r1	AK203199
Xanthoparmelia furcata (Mull. Arg.) Hale	r1	AK173598
Xanthoparmelia mexicana (Gyelnik) Hale	r1	AK193635
Xanthoparmelia mougeotina (Nyl.) D. Galloway	r15	AK203177
Xanthoparmelia neotinctina (Elix) Elix & J. Johnston	r3	AK203200
Xanthoparmelia scabrosa (Taylor) Hale	r1,r3,b5	AK173599
Xanthoparmelia thamnoides (Kurok.) Hale	r1	AK203202
Xanthoria elegans (Link) Th. Fr.	r1	AK173600
Xanthoria ligulata (Korber) P. James	r1	AK193563
Xanthoria parietina (L.) Th. Fr.	r1,b2	AK203292

FLORISTICS

New and significant records

These Little Barrier records are the second New Zealand records of five species: *Arthonia tumidula, Calicium robustellum, Dimerella zonata, Hypotrachyna immaculata* and *Lopadium monosporum* (endemic); and the third New Zealand records of: *Caloplaca litoralis* (endemic), *Heterodermia isidiophora* and *Megalospora bartlettii* (endemic). This record of *Xanthoparmelia mougeotina* is the first from the North Island and in addition the list includes the most northerly records in New Zealand of a further 20 species: *Arthonia tumidula, Byssoloma subdiscordans, Buellia nitrophylla, Calicium tricolor, Caloplaca litoralis, Cladia sullivanii, Cladonia crispata, Hypotrachyna immaculata, Hypotrachyna revoluta, Megaloblastenia flavidoatra, Opegrapha devia, Parmelia saxatilis, Parmelinopsis subfatiscens, Peltigera ulcerata, Pertusaria dactylina, Phyllopsora microdactyla, Siphula ramalinoides, Sphaerophorus patagonicus, Stereocaulon vesuvianum* and *Teloschistes xanthorioides.*

Floristic diversity

In this paper we record 251 lichen species in 96 genera from Little Barrier Island. This is very similar to the recorded lichen flora from nearby Great Barrier Island (247 species, 81 genera; Hayward et al. 1986). These are by far the largest of the offshore islands of northern New Zealand and therefore not surprisingly have the most diverse lichen floras. The next largest recorded lichen diversities on northern islands are on the Three Kings Islands (169 species, 81 genera; Galloway and Hayward 1987), Poor Knights Islands (144 species, 59 genera; Hayward and Wright 1991) and the Hen and Chicken Islands (156 species, 58 genera; Hayward and Hayward 1978, 1984). Of the two Barrier Island species lists, we consider that from Little Barrier Island to be the more complete and expect that a further 100, mostly microlichen, species probably occur on the larger Great Barrier Island, which also has the more diverse range of habitats. Combined Great and Little Barrier Islands have a lichen flora of 311 species in 104 genera. This is similar to comparable sized areas elsewhere in New Zealand (e.g. Waitakere Ranges, west Auckland — 372 species, 133 genera, Bartlett 1988; Nelson Lakes National Park — 260 species, 82 genera, Galloway and Simpson 1978).

Biogeographic elements in the lichen flora

Of the 251 species recorded here from Little Barrier Island, 30% are widespread cosmopolitan species of a temperate character (biogeographical terminology follows Galloway 1985). Species endemic to the New Zealand region account for 22% of the lichens recorded and 25% have an Australasian affinity. Pantropical taxa comprise 8%, paleotropical taxa comprise 3% and Western Pacific taxa comprise 3.5%. Austral species demonstrating an austral circumpolar distribution comprise 7% and bipolar species comprise 1.5%. In comparison with the total New Zealand lichen flora, that of Little Barrier reflects its northern geographic location, having a significantly larger percentage of pantropical and Western Pacific species and far fewer bipolar and endemic species.

Altitudinal zonation

In tandem with the vascular vegetation, the lichen flora also shows a rough zonation with increasing altitude. Some species occur from sea level all the way to the summit regions. A large group of lichens appear to be confined to lower altitudes and another group to higher altitudes. Table 1 presents data on the lowest recorded altitude of the more common members of the higher altitude lichen flora. Taxa restricted to the subalpine scrub and bluffs above 550 m on Little Barrier include the abundant *Siphula decumbens*, plus less common *Siphula ramalinoides, Sphaerophorus tener, Cladia sullivanii, Cladonia cornuta, C. crispata, C. squamosa, Nephroma plumbeum, Peltigera nana, P. ulcerata, Pertusaria dactylina, Phaeographis exaltata, Pseudocyphellaria rubella* and *Xanthoparmelia mougeotina*. Many of these are more common at lower altitudes in cooler more southern parts of New Zealand.

Of the common higher altitude forest lichens, the dominant *Sticta filix* is abundant above about 550 m with a lower limit for sparse colonisation of about 450 m. The common foliose *Pseudocyphellaria faveolata* has not been recorded below 450 m, *Sphaerophorus melanocarpus* not below 400 m, *Pseudocyphellaria multifida* not below 300 m and *Pseudocyphellaria glabra* not below 250 m. Of the common and distinctive higher altitude crustose lichens, *Coccotrema cucurbitula* has not been recorded below 450 m, *Miltidea ceroplasta* not below 350 m and *Catillaria kelica* not below 250 m. The main factor producing this altitudinal zonation on Little Barrier is not altitude above sea level per se, but probably a combination of increasing humidity and rainfall and slightly lower temperatures. The top of the island is clothed in cloud for considerable periods of time throughout the year.

LICHEN COMMUNITIES AND HABITATS

Marine and maritime

Most of Little Barrier Island is surrounded by mobile boulder beaches and relatively soft, rapidly eroding cliffs of laharic breccia that support virtually no lichen flora. A few andesite lava flows form intertidal reefs and maritime cliffs on the north and east coasts. Two black, rather nondescript lichens (*Verrucaria maura* and *Lichina confinis*) grow intertidally on these more stable reefs and a wide range of maritime lichens occur higher on these more solid cliffs. Stabilised boulders above storm wave height at the top of some of the boulder beaches (especially those fringing Te Titoki Point) also have a rich and diverse maritime lichen cover.

A total of 72 species have been recorded here from the maritime zone, within 30 m of the high tide mark and between 0 and 5 m above sea level. Lower on the shore and nearer high tide mark, the lichen flora is dominantly white and grey crustose types of the genera *Buellia, Lecidea* and *Pertusaria*. A little higher the rocks become covered in grey foliose forms mostly of the genera *Rimelia, Parmotrema* (4 spp.) and *Heterodermia* (4 spp.) and the yellow green foliose *Xanthoparmelia* (6 spp.). Higher in this zone, the rocks become more weathered, they are more stable, often partly shaded and may develop thin soil in crevices. Here the full diversity of maritime

Table 1. Lowest recorded altitude occurences (m above sea level) of some common macrolichens on Little Barrier Island. Comparisons with observations on Great Barrier (Hayward et al. 1986) are presented.

	Little Barrier			Great
	NE side	W side	S side	Barrier
Pseudocyphellaria glabra	300	270	250	?
Pseudocyphellaria multifida	350	300	300	?
Sphaerophorus patagonicus	480	300	—	450
Catillaria kelica	500	400	300	absent
Miltidea ceroplasta	—	—	350	480
Sphaerophorus melanocarpus	—	—	400	—
Pseudocyphellaria faveolata	—	—	450	—
Coccotrema cucurbitula	—	—	450	400
Sticta filix	450	550	450	absent
Sphaerophorus tener	—	—	660	—
Cladia sullivanii	—	560	580	350
Siphula decumbens	660	650	660	520

lichens is found with the prominent addition of the dark olive green foliose *Neofuscelia*, foliose *Pannaria elatior*, fruticose *Ramalina, Cladia aggregata, Cladonia* and *Stereocaulon ramulosum* and crustose *Lecanora campestris* and *Opegrapha diaphoriza.*

In several locations, rotting driftwood logs, cast high up above high tide mark by storms, are the only places where *Calicium* (all 3 species), *Cladonia pyxidata* and *Thysanothecium scutellatum* have been found on the island.

Coastal scrub

Coastal scrub occurs sporadically around the coast of Little Barrier between the top of the boulder beaches and the foot of the cliffs behind. The scrub usually has a wind-shorn canopy and is a mixture of taupata (*Coprosma repens*), *Melicytus novae-zelandiae*, karo, and kawakawa. A sparse but characteristic low diversity lichen flora is commonly encountered. It consists of a mix of yellow lichens of the genera *Xanthoria* and *Caloplaca*, grey *Physcia caesia* and several crustose species, especially *Opegrapha intertexta.* Lichens recorded only from this distinctive habitat include yellow-grey *Teloschistes chrysophthalmus*, orange crustose *Caloplaca inclinans*, red-fruited crustose *Lecidea laeta* and crustose *Trapeliopsis congregans.*

Coastal pohutukawa

Scattered pohutukawa forest occurs around the coast of Little Barrier — on some of the cliffs, on talus at the foot of some of these, and in the mouths of the larger stream valleys. The most notable area of almost pure pohutukawa coastal forest covers about 1.5 ha of the south-western part of Te Maraeroa. Forty-three lichen species have been recorded from this habitat — 36 species growing on the rough pohutukawa bark and 11 on the rocks beneath.

The lichens growing on pohutukawa bark are dominated by fruticose forms, especially species of *Hypotrachyna* (*H. osseoalba, H. immaculata*), *Parmelinopsis* (*P. jamesii, P. spumosa*), *Parmotrema* (*P. chinense, P. crinitum, P. tinctorum*), *Rimelia* (*R. cetrata, R. reticulata*) and *Pannaria elatior*. Also common is the fruticose old man's beard lichen (*Usnea inermis*). Taxa only found so far on pohutukawa bark on Little Barrier include the crustose *Lecanora symmicta, L. chlarotera, Megaloblastenia marginiflexa, Pertusaria sorodes* and foliose *Hypotrachyna immaculata*.

The rocks beneath the semi-open pohutukawa canopy are dominated by foliose *Parmotrema crinitum, Heterodermia japonica* and tufted *Ramalina celastri*.

Grassland and orchard

Much of Te Maraeroa, the flat land built up behind the Te Titoki boulder spit, is grazed mixed pasture with occasional large specimen trees of kanuka. These mature kanuka growing in the open have a rich lichen flora with 25 species recorded growing on their thick papery bark. Crustose species are rare but the abundant foliose types are often large healthy specimens dominated by *Pseudocyphellaria* (5 spp.), *Sticta* (3 spp.), *Leptogium* (4 spp.) and *Collema* (2 spp.). *Hypotrachyna revoluta, Lecidea cerinocarpa, Pseudocyphellaria granulata* and *Pseudocyphellaria haywardiorum* have been recorded so far only from this habitat on Little Barrier.

An aging orchard with a wide variety of fruit and ornamental trees grows on the flat around the ranger's house and the visitors' bunkhouse. Some of these introduced trees support a rich lichen flora, particularly characterised by old man's beard lichens (*Usnea* 3 spp.) and script lichens (*Phaeographis australiensis, Opegrapha intertexta*). Four species not recorded elsewhere on the island on the indigenous vegetation are *Arthonia tumidula* (on an old walnut tree), *Melaspilea subeffigurans, Punctelia borreri* and *Teloschistes xanthorioides* (on an old fig tree).

Mature kanuka and kanuka-mixed forest

Approximately one-third of Little Barrier Island is clothed in kanuka and kanuka-mixed forest in varying stages of transition to kauri and broadleaf forest, following clearing by the prehistoric Maori and by kauri logging and firewood operations in European times. This type of forest is all low altitude, below about 300 m above sea level and concentrated on the remnants of the old volcanic ring plain, especially around the south and west sides of the island. On the valley sides, the forest is quite damp which has hastened regeneration of tree species in addition to kanuka, resulting in a canopy that is often quite dense with a shade tolerating lichen flora (26 spp.). On the ridge crests however, the forest is often still primarily mature kanuka with a more open canopy allowing the growth of a luxuriant lichen flora (73 spp.) both on the flaking kanuka bark (53 spp.) and also on the forest floor beneath (22 spp.). By far the most abundant lichen type colonising kanuka bark is the foliose group, dominated by 9 species of *Pseudocyphellaria* (especially *P. carpoloma, P. montagnei* and *P. coriacea*), *Sticta latifrons*, 5 species of *Psoroma*, all 3 species of *Coccocarpia*, 3 species of *Heterodermia* and 4 species of *Pannaria*. Among the sporadic crustose lichens growing on kanuka bark, the most common are 3 species of script lichen *Opegrapha* and *Thelotrema lepadinum*. Beneath the kanuka forest, the ground

dwelling lichens are dominated by reindeer lichen *Cladina confusa, Cladia aggregata, Stereocaulon ramulosum, Cladonia capitellata, C. chlorophaea, C. ochrochlora* and 6 other species of *Cladonia* and 3 species of *Pannaria*. Also locally common on clay banks are *Baeomyces arcuatus* and *B. heteromorphus* and in damper situations amongst moss is *Peltigera dolichorhiza*.

Kauri forest

On Little Barrier, kauri forest, sometimes with co-dominant hard beech or miro (*Prumnopitys ferruginea*) occurs as a mosaic on ridges and upper valley sides 100-500 m above sea level. Forty-six species of lichen have been recorded from this forest type so far. The visibly most dominant species on bark are the foliose *Pseudocyphellaria glabra, P. multifida, Psoroma* (6 spp.), *Sticta latifrons, Heterodermia* (3 spp.) and *Menegazzia* (4 spp.). Several crustose forms are common on bark, especially *Megalospora gompholoma, M. knightii* and *Megalaria grossa*. No lichens were found growing on the very rough bark of mature hard beech trunks, although the smoother bark of the younger trees and limbs sometimes supported the script lichens *Graphis librata* and *Opegrapha intertexta*.

The distinctive *Metus conglomeratus*, with black apothecia on fissured green podetia, occurs quite commonly on moss-covered clay beneath the kauri mixed forest canopy.

Mixed forest (250-500 m above sea level)

Between 250 m and 500 m above sea level on Little Barrier, the forest cover consists of a kauri mosaic interspersed with a mixed broad-leaved forest dominated by tawaroa and northern rata (*Metrosideros robusta*) with common miro, Hall's totara (*Podocarpus hallii*) and pukatea (*Laurelia novae-zelandiae*). This mixed forest fills most of the valleys but also extends up onto the ridge crests in many places.

A rich and diverse epiphytic lichen flora occurs in this mixed, tawaroa-dominated forest. *Pseudocyphellaria* (7 spp.) are the dominant foliose lichens, especially *P. multifida* and *P. glabra*. The most abundant crustose lichens are *Megalospora* (4 spp.), the script lichens *Phaeographis* and the bright yellow-fruited *Catillaria kelica*. The dimly-lit forest floor, especially in the valleys, are often festooned with prolific grey foliose *Pseudocyphellaria dissimilis*.

Mixed forest (500-700 m above sea level)

On reaching about 500 m above sea level while ascending Little Barrier, the forest becomes dominated by tawhero (*Weinmannia sylvicola*) with common associated tawaroa. Still higher on the ridges, above about 600 m, this forest type grades into a mixture of tawari (*Ixerba brexioides*), southern rata and tawheowheo (*Quintinia acutifolia*). The canopy is quite low (3-5 m) but beneath it high humidity conditions are constantly present with the trees draped in mosses, liverworts, filmy ferns and lichens.

Foliose and fruticose lichens dominate, with the stalked, lettuce green foliose *Sticta filix* usually the most abundant, followed by foliose *Pseudocyphellaria multifida, P. faveolata, and P. glabra*, and fruticose *Sphaerophorus melanocarpus* and *Cladia aggregata. Sphaerophorus tener* and *Siphula decumbens* are abundant above about 650 m.

Subalpine scrub and bluffs

On the most exposed peaks near the top of Little Barrier (e.g. Hauturu, Bald Rock, The Thumb and a ridge crest 800 m north-west of Hauturu), the high altitude forest is kept to a 1-2 m high scrub by the prevailing strong winds. The scrub is varied and diverse in composition (Hamilton and Atkinson 1961), as is the lichen flora with 49 species so far recorded. No lichens dominate, but common epiphytic species include *Siphula decumbens, Sticta filix, S. latifrons, Pseudocyphellaria coronata, P. faveolata, P. glabra, P. lividofusca, Sphaerophorus tener* and the crustose *Phaeographis exaltata* and orange-fruited *Miltidea ceroplasta. Cladina confusa, Cladonia* (7 spp.) and *Peltigera* (2 spp.) are the most abundant epigean lichens.

On some of the steepest rocky bluffs at the top of the island (e.g. Bald Rock), the elements have been too severe for most higher plants to colonise, but lichens such as *Hypogymnia subphysodes, Stereocaulon ramulosum S. vesuvianum, Rimelia* (2 spp.) and *Parmotrema* (3 spp.) flourish on moist faces. Fruticose lichens, such as *Cladia aggregata, C. retipora, C. sullivanii, Cladina confusa, Cladonia capitellata* and *C. floerkeana* often grow on small patches of soil that have accumulated in crevices in the rock.

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MOSSES OF TAWHITI RAHI, POOR KNIGHTS ISLANDS, NORTHERN NEW ZEALAND

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Abstract. An annotated list of 52 species from 23 families of mosses is provided for Tawhiti Rahi, bringing the total number of mosses known from the Poor Knights Islands to 71 species. The moss flora of Tawhiti Rahi differed significantly from that of Aorangi, the other large island in the Poor Knights group, the differences being in part attributed to the different microhabitats available on the two islands. Nevertheless, there are similarities, with 40 species in common. As on Aorangi, the moss flora of Tawhiti Rahi reflects the relatively dry climate of these low-lying offshore islands and includes a significant tropical element.

The Poor Knights Islands lie 20 km off the east coast of the North Auckland peninsula, at latitude 35° 28'S, longitude 174° 44'E (Fig. 1). They comprise two main islands (Fig. 2), Tawhiti Rahi and Aorangi, together with a number of smaller islands and islets, with a total area of 271 ha. The islands in the group are remnants of a large rhyolitic volcano, composed of hydrothermally altered lava, breccia and tuff (Wodzicki & Bowen 1979). Tawhiti Rahi (151 ha) is the largest and northernmost island of the group. Surrounded by steep cliffs rising 20-160 m above sea level, it consists of an elevated, gently rolling plateau in the north, rising to two small prominences of 190 m and 191 m respectively. The plateau is separated by rocky bluffs from the more steeply dissected southern portion of the island.

The Poor Knights Islands are the breeding ground for over 2 million sea-birds, mainly Buller's Shearwater, which breeds only on these islands (Harper 1983). As noted by Kinsky & Sibson (1959), all the 'best slopes' on Tawhiti Rahi are honeycombed with bird burrows. Although the islands were extensively modified by Maori occupation (Fraser 1925) which lasted until the 1820's (Harper 1975), and have more recently suffered occasional fires (Kinsky & Sibson 1959; Parris 1970), they retain distinctive biota, with several endemic or otherwise rare forms (see for example Oliver 1925; Watt 1982; Harper 1983; Brownsey & Jackson 1984). For this reason they remain an important Nature Reserve.

The present account of the mosses of Tawhiti Rahi is based on field work and collections made during a visit to the island from 20-27 April 1991, under the auspices of the Department of Conservation. An earlier account of the mosses of the Poor Knights Islands (Beever 1986) was based largely on my studies on Aorangi during a visit by the Offshore Islands Research Group from 27 August — 3 September 1984, with one hour only spent on Tawhiti Rahi. Records based on specimens collected by

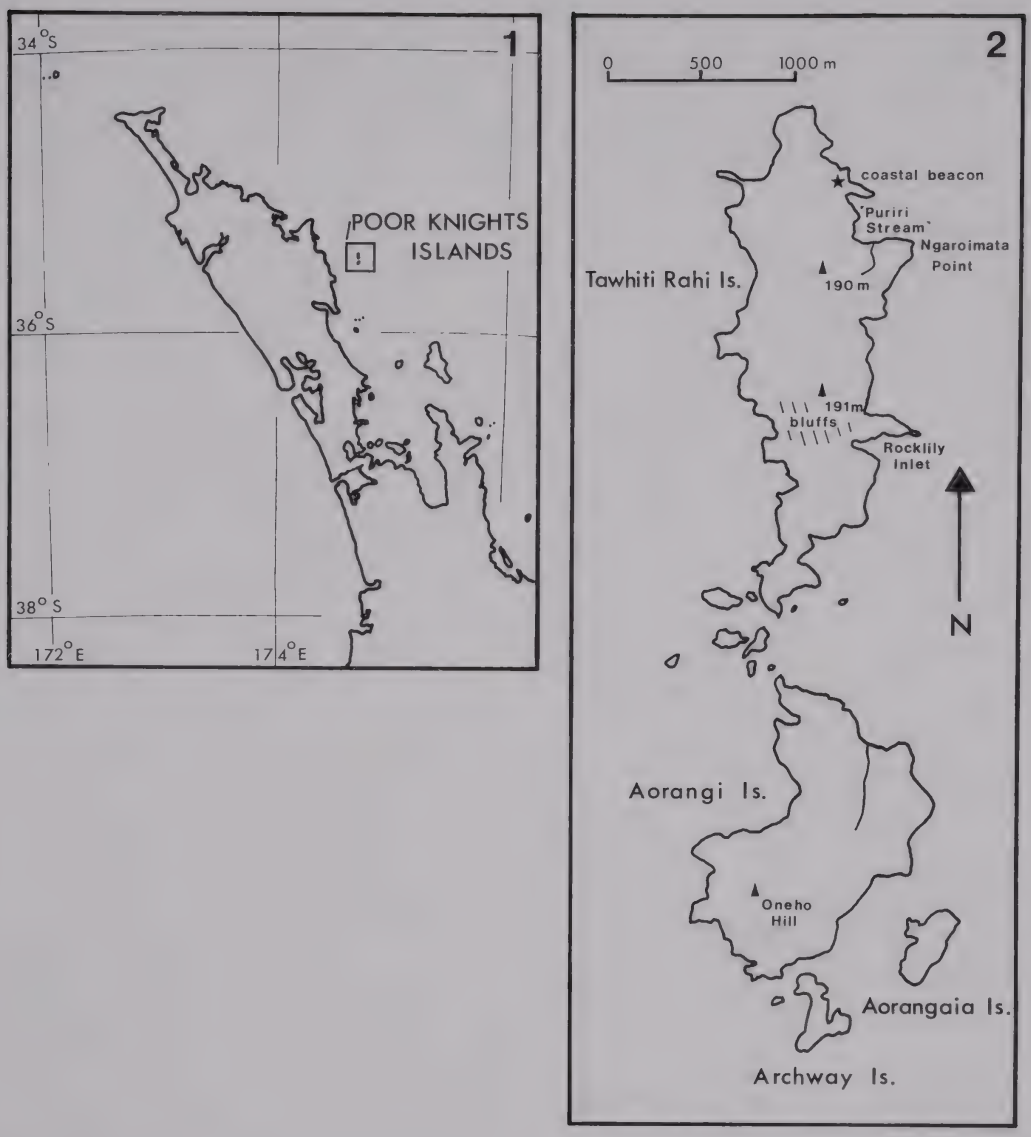

Fig. 1,2. 1. Location of Poor Knights Islands in northern New Zealand. 2. Poor Knights Islands, showing localities mentioned in the text.

A.E. Wright in 1980 and L.B. Moore and L.M. Cranwell in 1933 and 1937 were included, giving a total of 59 moss species from the Poor Knights Islands as a whole, with 13 species recorded from Tawhiti Rahi. The present account thus complements the 1984 study in its coverage of the main islands of the group. Throughout the present paper comments on the mosses of Aorangi Island are based on the data of Beever (1986).

Vascular plant vegetation of Tawhiti Rahi

Cockayne (1906), Oliver (1925) and Cranwell (1937) give brief accounts of the botany of the Poor Knights Islands. Permanent vegetation quadrats were established on Tawhiti Rahi by Parris (1970).

Most of the island is covered with forest dominated by pohutukawa (*Metrosideros excelsa*), some 6-12 m high. Over large areas the forest canopy is pure pohutukawa, but in places kanuka (*Kunzea ericoides*), tawapou (*Planchonella costata*), kohekohe (*Dysoxylum spectabile*), large-leaved milk-tree (*Streblus banksii*), and coastal maire (*Nestegis apetala*), are associate tree species, with occasional manuka (*Leptospermum scoparium*), puriri (*Vitex lucens*), tawaroa (*Beilschmiedia tawaroa*), and kauri (*Agathis australis*). On the main plateau extensive areas of pohutukawa forest have a ground cover of Poor Knights lily (*Xeronema callistemon*). The living shoots of the Poor Knights lily are raised on massive mounds of dead leaf bases. *Astelia banksii* is another very common ground plant in forest, its decayed bases often remaining as small mounds of humus after the plants have died. The southern part of the island, where fires occurred in about 1923 (Kinsky & Sibson 1959) and 1957 (Parris 1970), bears a low forest-scrubland of pohutukawa, mahoe (*Melicytus ramiflorus*), karo (*Pittosporum crassifolium*), karamu (*Coprosma macrocarpa*), karaka (*Corynocarpus laevigatus*) and Poor Knights mapou (*Myrsine divaricata*), with whau (*Entelea arborescens*) common in canopy gaps. *Astelia banksii* and the ferns *Asplenium oblongifolium*, *Phymatosorus diversifolius* and *Pyrrosia eleagnifolia* are the commonest ground plants in this area. Some ridgetop sites have suffered considerable soil erosion, leaving patches bare of vegetation. Areas of scrub are found on inland bluffs and on tops of the sea-cliffs, especially around the hanging valleys of the several intermittent streams on the island. New Zealand flax (*Phormium tenax*), karo, *Melicytus novae-zelandiae*, ngaio (*Myoporum laetum*) and taupata (*Coprosma repens*) are the dominant species in such sites. Exposed rock communities are found on inland bluffs and on the sea-cliffs. The latter are very steep and were little explored. Flax, Poor Knights lily, and *Chionochloa bromoides* are the most conspicuous plants in this habitat, with small pockets of salt meadow dominated by New Zealand iceplant (*Disphyma australe*) and glasswort (*Sarcocornia quinqueflora*).

Moss floristics

Fifty-two species of moss from 23 families were found on Tawhiti Rahi, including all 13 species previously recorded. Eleven species are new records for the Poor Knights Islands as a whole, bringing the total species for the island group to 71. (Of this total, one species, *Tortella mooreae*, has been found only on Archway Island.) Three of the new records are ruderal species, found in sites of recent human disturbance; the remaining eight are mosses of northern New Zealand coastal forests or exposed coastal rocks. Two tropical species, *Syrrhopodon armatus* and *Fissidens hyophilus*, both rarely recorded in New Zealand but known on Aorangi, were found to be locally abundant on Tawhiti Rahi, and two others which also reach the southern limits of their distribution in northern parts of New Zealand, *Macromitrium brevicaule* and *Sematophyllum homomallum*, were likewise found on Tawhiti Rahi. *Campylopus catarractilis*, recorded new to New Zealand on Aorangi, was not seen.

Major moss habitats

Nowhere on Tawhiti Rahi were mosses conspicuous, and, of 52 species recorded, 25 were rare. A wide variety of substrates, however, in forest, scrub and open communities, were occupied by mosses.

In forest and scrub, shaded rock outcrops, especially at higher altitudes and on south-facing slopes, were frequently colonised by *Racopilum convolutaceum*, *Thuidium sparsum*, *Camptochaete pulvinata*, *Fissidens hyophilus*, and swards of the minute *F. linearis*. Small stones occasionally bore *Eurhynchium muriculatum* and *Fissidens pungens*. The humus mounds formed from decomposing bases of vascular plants such as *Astelia banksii*, Poor Knights lily, *Chionochloa bromoides*, and even flax, provided a substrate for *Campylopus pyriformis*, *C. introflexus*, *Dicranoloma fasciatum*, *Isopterygium minutirameum*, *Hypnum chrysogaster*, *Sematophyllum amoenum* and *S. homomallum*. Rotten wood on the forest floor often bore *Sematophyllum amoenum*, and occasionally *Hypnum chrysogaster*. Tree bases and exposed roots were occasionally colonised by *Fissidens hyophilus*, *Thuidium sparsum* and *Hypnum chrysogaster*, and less often by *Leucobryum candidum*, *Pendulothecium punctatum* and *Zygodon intermedius*. Epiphytes on the higher parts of trees were not common: *Macromitrium gracile*, *M. prorepens*, *Hypnum chrysogaster* and *Sematophyllum homomallum* were occasional epiphytes, mainly on pohutukawa, while *Dicranoloma menziesii* and *Wijkia extenuata* were rare. Although a number of streams drain Tawhiti Rahi, all ending in hanging valleys at the top of the sea-cliffs, running water was not observed in any of them during the visit. The damp rock and soil of their beds provided, however, suitable sites for several species of mosses: *Fissidens linearis*, *Pendulothecium punctatum*, *Hypnodendron spininervium* and *Leucobryum candidum* were all locally abundant. Undisturbed soil away from water courses was less often colonised by mosses, although *Fissidens linearis* and *Isopterygium minutirameum* were recorded on this substrate. Where sea-bird burrows are dense, areas of bare soil many square metres in extent occur under the forest canopy. Soil disturbance, mechanical damage (graphically illustrated by the numerous scratches on lower leaves of Poor Knights lily plants adjacent to burrows), the toxic effect of bird droppings, and modified drainage properties may all contribute to the absence of ground plants. Occasionally colonies of the mosses *Campylopus pyriformis C. ?introflexus* and *Isopterygium minutirameum* were found on the dark reddish-brown humic loam of such sites. In some intensely burrowed areas soil erosion had resulted in extensive exposure of the roots of canopy trees, and these were in some places colonised by the mosses *Fissidens hyophilus* and *Thuidium sparsum*. *Syrropodon armatus* was seen several times where thin soil had accreted on rock outcrops adjacent to bird burrows.

In exposed sites a different assemblage of mosses was found: *Bryum campylothecium* grew on dry rock outcrops, while in small salt meadows *Tortella rubripes*, *Campylopus introflexus* and *Trichostomiopsis australasiae* were found. This last species also occurred on eroding ridgetops, together with *Bryum dichotomum*. At Ngaroimata Point, on a rock shelf topping 15 m vertical coastal cliffs, a seepage on the margins of a brackish pool contained the only well-developed plants of *Hypnodendron spininervium* seen on the island. At two exposed sites created by recent human disturbance a number of characteristic species were found. Concrete

and discarded rope at the site of the Ministry of Transport coastal beacon had been colonised by *Tortula muralis*, *Bryum argenteum*, *B. sauteri* and *B. dichotomum*, with *Ceratodon purpureus* on disturbed ground nearby. In an illegal forest clearing, 3.5 by 7 m in area, in pohutukawa forest south of Rocklily Inlet, *Funaria hygrometrica*, *Fissidens pungens* and *Bryum microerythrocarpum* were present on disturbed soil. With the exception perhaps of *Hypnodendron spininervium*, which in my experience is confined to permanently damp sites, all species recorded can apparently tolerate long periods of desiccation, and thus reflect the relatively dry climate of this low-lying offshore island.

Comparison with the moss flora of Aorangi Island

Not unexpectedly, the moss flora of Tawhiti Rahi was found to be similar to that of Aorangi, an island of similar geology, and separated by a sea-gap of only 400 m. The differences are, however, significant. Of a total of 70 species now recorded from the two islands, 40 species have been found on both. Among these 40 species some occur in significantly greater abundance on one island, and, while further exploration will undoubtedly add to the species lists, 30 mosses are at present recorded from only one island. These differences reflect to some extent the different habitats available for mosses. On Aorangi, in contrast to Tawhiti Rahi, two luxuriant bryophyte communities were found: where extensive seepages ran over exposed coastal rock platforms, and on the highest point, Oneho Hill, which at 216 m is 25 m higher than the highest point on Tawhiti Rahi. Few coastal seepages were seen on Tawhiti Rahi, and two species confined to this habitat on Aorangi, *Campylopus catarractilis* and *Bryum erythrocarpoides* (the latter recorded as *B. clavatum* and *B.* sp. undescribed), have not been recorded on Tawhiti Rahi. *Philonotis tenuis*, a rare moss on Tawhiti Rahi, was much more common on Aorangi, forming extensive clumps in the numerous coastal seepages. The habitat on Oneho Hill, where there are abundant epiphytic bryophytes and a dense carpet of moss on the ground, is unlike any seen on Tawhiti Rahi. Ten species are known on the Poor Knights Islands only from this area. *Leptostomum macrocarpum* and *Dicranoloma menziesii* were common epiphytes on Oneho Hill, while *Ptychomnion aciculare* and *Thuidium furfurosum* formed luxuriant mats on the ground. These four species were all rare on Tawhiti Rahi. The microclimatic effect of the 25 m greater elevation of Aorangi may thus be a significant factor in the development of a moss-rich community. Three species recorded only on Tawhiti Rahi were from sites of recent human disturbance, the coastal beacon and an illegal clearing, habitats not found on Aorangi. Of the other species found on only one island, three were occasional, *Ptychomitrium australe*, *Pendulothecium punctatum* and *Dicranoloma fasciatum*. These species may be found in due course on both islands, as suitable habitats appear to be present. Twelve remaining species found on only one island were rare, and there may be a chance element in their distribution.

ANNOTATED SPECIES LIST

This list includes all species of mosses that were found on Tawhiti Rahi. Species are arranged in families, listed in alphabetical order, with accession numbers of voucher specimens lodged in the herbarium of the Auckland Institute and Museum (AK). An estimate of abundance is given by the scale 'rare', 'occasional', 'common', 'abundant'. 'Locally abundant' indicates that the species was seen at few sites, but was

represented there by many individuals. The abbreviation '*C.fr.*' (*cum fructibus*) indicates that capsules were seen, 'Aorangi' that the species has been recorded on Aorangi, and 'New record' that the species is recorded for the first time from the Poor Knights Islands.

Bartramiaceae

Philonotis tenuis (Tayl.) Reichdt. AK 202180, 202181
Rare, on damp soil, shaded or exposed. Aorangi.

Brachytheciaceae

Eurhynchium muriculatum (Hook.f. & Wils.) Jaeg. AK 202125, 202157
Occasional, on rock, especially small stones, shaded. *C. fr.* Aorangi.

Rhynchostegium tenuifolium (Hedw.) Reichdt. AK 202147, 202156
Common, on soil and rock, lightly shaded. *C. fr.* Aorangi.

Bryaceae

Bryum argenteum Hedw. AK 202154
Rare, on concrete and discarded rope adjacent to the coastal beacon, exposed. Aorangi.

Bryum billardierei Schwaegr. var. *platyloma* Mohamed AK 202172
Rare, on soil and kanuka duff, shaded. *C. fr.* Aorangi.

Bryum campylothecium Tayl. AK 202158
Rare, on rock, exposed. Aorangi.

Bryum dichotomum Hedw. AK 201763, 201817
Occasional, on concrete adjacent to the coastal beacon and on soil, exposed. Aorangi.

Bryum microerythrocarpum C. Muell. & Kindb. AK 202159
Rare, on disturbed soil in anthropogenic forest clearing. New record.

Bryum sauteri B.S.G. AK 202153
Rare, on discarded rope adjacent to the coastal beacon, exposed. Aorangi.

Leptostomum macrocarpum (Hedw.) Pyl. AK 202139
Rare, on decomposing *Astelia* bases, lightly shaded. Aorangi.

Calymperaceae

Syrrhopodon armatus Mitt. AK 202160, 202179
Locally abundant, forming sheets up to 1 x 0.25 m in extent, on thin soil over rock in bird-burrowed areas, lightly shaded. Aorangi, as *S. fimbriatulus* C. Muell.

Dicranaceae

Campylopus introflexus (Hedw.) Brid. AK 201748, 202152
Occasional, on bare soil and decomposing Poor Knights lily bases, lightly shaded or exposed. Aorangi.

Campylopus pyriformis (Schultz) Brid. AK 201738, 202162
Common on decomposing Poor Knights lily bases and other humic material, and on soil in bird-burrowed areas, lightly shaded. Aorangi.

Dicranoloma fasciatum (Hedw.) Par. AK 202134, 202149
Occasional, on decomposing *Astelia* bases, lightly shaded. New record.

Dicranoloma menziesii (Hook.f. & Wils.) Par. AK 202133
Rare, epiphytic, on rock and on rotting wood, lightly shaded. Aorangi.

Leucobryum candidum (P. Beauv.) Wils. AK 202135
Occasional, on soil, tree bases and decomposing *Astelia* bases, lightly shaded. Locally abundant in the upper reaches of Puriri Stream. Aorangi.

Ditrichaceae

Ceratodon purpureus (Hedw.) Brid. AK 202151
Rare, on soil adjacent to the coastal beacon, exposed. New record.

Echinodiaceae

Echinodium umbrosum (Mitt.) Jaeg. AK 202146, 202171
Locally common on rocks in Puriri Stream, rare elsewhere on rock, shaded. Aorangi.

Fissidentaceae

Fissidens asplenioides Hedw. AK 202176
Rare, on rock, shaded. New record.

Fissidens hyophilus Mitt. AK 201699, 202124
Locally abundant, on rock, and occasional, on tree bases and exposed roots, shaded. *C. fr.* Aorangi, as *F. oblongifolius* Hook.f. & Wils.

Fissidens leptocladus C. Muell. & Rodw. AK 202174, 202177
Rare, coastal scrub, shaded. Aorangi.

Fissidens linearis Brid. var. *aeruginosus* Stone AK 202169, 202170
Locally abundant on soil and rock of Puriri Stream bed, shaded. *C. fr.* Aorangi, as *F. humilis* Dix. & Watts var. *angustifolius* Dix.

Fissidens linearis Brid. var. *linearis* AK 202163, 202175
Common, on soil and rock, sometimes in extensive swards, shaded. *C. fr.* Aorangi, as *F. humilis* Dix. & Watts var. *allisonii* Dix. & Sainsb.

Fissidens pungens C. Muell. & Hampe AK 202123, 202165
Occasional, on rock and soil, lightly shaded. *C. fr.* Aorangi.

Fissidens tenellus Hook.f. & Wils. AK 202137
Occasional, on rock, as an epiphyte, on decomposing *Astelia* bases, and on a long-dead pig's skull, lightly shaded. *C. fr.* Aorangi.

Funariaceae

Funaria hygrometrica Hedw. AK 202166
Rare, on disturbed soil in anthropogenic forest clearing. Aorangi.

Hookeriaceae

Achropyllum dentatum (Hook.f. & Wils.) Vitt & Crosby AK 202161
Occasional, on decomposing *Astelia* bases, and on soil and rock of stream beds, shaded. Aorangi.

Calyptrochaeta brownii (Dix.) J.K. Bartlett AK 202144
Occasional, on rock and exposed roots on south-facing slopes, shaded. Aorangi, as *Eriopus brownii* Dix.

Hypnaceae
Hypnum chrysogaster C. Muell. AK 202132, 202167
Occasional, on a wide variety of substrates, usually lightly shaded. *C. fr.* Aorangi.

Hypnodendraceae
Hypnodendron spininervium (Hook.) Jaeg. AK 201722, 201723
Locally abundant, on damp soil and rock in the lower reaches of several streams, and in a freshwater seepage on Ngaroimata Point, shaded or exposed. Aorangi.

Hypopterygiaceae
Hypopterygium rotulatum (Hedw.) Brid. AK 202140
Rare, on rock and rotting wood, shaded. New record.

Lembophyllaceae
Camptochaete arbuscula (Sm.) Reichdt. AK 201792, 201793
Occasional, on rock and tree bases, shaded. Aorangi, as *Camptochaete arbuscula* (Sm.) Reichdt. *sensu lato*.

Camptochaete pulvinata (Hook.f. & Wils.) Jaeg. AK 201789, 201790
Common, on rock, shaded. Aorangi.

Camptochaete ramulosa (Mitt.) Jaeg. AK 201791
Rare, on rock, near summit of the island, lightly shaded. New record.

Meteoriaceae
Papillaria crocea (Hampe) Jaeg. AK 202128
Rare, epiphytic near summit of the island, lightly shaded. Aorangi.

Neckeraceae
Pendulothecium oblongifolium (Hook.f. & Wils.) Enroth & He AK 202141
Rare, on small stone on forest floor, shaded. New record.

Pendulothecium punctatum (Hook.f. & Wils.) Enroth & He AK 202145
Occasional, on rock and exposed roots, shaded. Locally abundant on rocks in the lower reaches of Puriri Stream. New record.

Orthotrichaceae
Macromitrium brevicaule (Besch.) Broth. AK 201727
Rare, on rock in coastal scrub, lightly shaded. Aorangi, as *M. wattsii* Broth.

Macromitrium gracile (Hook.) Schwaegr. AK 202129
Occasional, epiphytic on pohutukawa and karo, and rare, on rock, lightly shaded. Not recorded by Beever (1986) on Aorangi but a specimen, CHR 398311, collected by L.B. Moore Feb. 1937, with locality 'Poor Knights Is.' is probably from that island.

Macromitrium prorepens (Hook.) Schwaegr. AK 202136, 202138
Occasional, epiphytic on pohutukawa, lightly shaded. *C. fr.* Aorangi.

Zygodon intermedius B.S.G. AK 202130
Rare, on tree base near summit of the island, lightly shaded. Aorangi.

Plagiotheciaceae
Isopterygium minutirameum (C. Muell.) Jaeg. AK 202126, 202131
Occasional, on soil, rock and humic material, lightly shaded. *C. fr.* Aorangi.

Pottiaceae
Tortella rubripes (Mitt.) Broth. AK 201690
Rare, in salt meadow 30 m above sea level, exposed. New record.

Tortula muralis Hedw. AK 202155
Rare, on concrete base of coastal beacon, exposed. *C. fr.* New record.

Trichostomiopsis australasiae Card. AK 201764, 201816
Rare, on soil, exposed. New record.

?*Trichostomum brachydontium* Bruch AK 202178
Rare, on soil in coastal scrub, lightly shaded. Aorangi.

Ptychomniaceae
Ptychomnion aciculare (Brid.) Mitt. AK 202173
Rare, on forest floor under kanuka, lightly shaded. Aorangi.

Racopilaceae
Racopilum convolutaceum (C. Muell.) Reichdt. AK 202164
Common, on rock, shaded. *C. fr.* Aorangi.

Sematophyllaceae
Sematophyllum amoenum (Hedw.) Mitt. AK 201735, 202150
Common, on rotting wood, occasional, on decomposing *Astelia* bases and other humic material, lightly shaded. *C. fr.* Aorangi.

Sematophyllum homomallum (Hampe) Broth. AK 201678, 201725
Occasional, on a wide variety of substrates. More luxuriant in high light conditions. Aorangi.

Wijkia extenuata (Brid.) Crum AK 202127
Rare, epiphytic on pohutukawa, lightly shaded. New record.

Thuidiaceae
Thuidium furfurosum (Hook.f. & Wils.) Reichdt. AK 202168
Rare, on forest floor, lightly shaded. Aorangi.

Thuidium sparsum (Hook.f. & Wils.) Jaeg. AK 201700, 202148
Common, on rock, occasional, on tree bases, exposed roots and soil, shaded. Aorangi, as *T. furfurosum* (Hook.f. & Wils.) Jaeg. var. *sparsum* (Hook.f. & Wils.) Sainsb.

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DISTRIBUTION AND ZOOGEOGRAPHY OF NEW ZEALAND MEGALOPTERA AND NEUROPTERA

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Abstract. The 1 Megaloptera species and 15 Neuroptera species occurring in the New Zealand subregion are listed and their distributions and suggested status given. The Neuroptera include 7 endemic, 4 indigenous and 4 introduced species. Distributions within the subregion are given in a table and illustrated in maps. Wider distributions for all species are also given in a table. The indigenous species are common to Australia and New Zealand and are considered to be wind-borne in New Zealand. The overall distribution of these species are illustrated in maps, by family. In each of three family maps another, non-New Zealand, species is shown for comparison. The endemic species may have arisen through an ancient Gondwanaland connection with Australia and South America. The distributions of all species are shown diagrammatically to illustrate possible zoogeographical relationships.

The New Zealand Megaloptera fauna consists of 1 endemic aquatic species. The Neuroptera fauna is made up of 7 endemic species, 4 indigenous species common to Australia and New Zealand, and 4 accidentally introduced species. (Species purposely introduced as pest predators are not included as none have established.) Table 1 lists the 16 species and gives their suggested status.

Two Chrysopid species referred to in this paper have been largely recorded in literature and in specimen collections as *Chrysopa basalis* and *Chrysopa ramburi* but in more recent years this genus has been divided considerably (see Brooks & Barnard 1990). The current combinations for the two species are given in Table 1 (for the New Zealand species, as *Mallada basalis*) and in the text (for the exotic species, as *Plesiochrysa ramburi*) but elsewhere combinations with *Chrysopa* are retained for comparative purposes.

NEW ZEALAND DISTRIBUTIONS

In Table 2 the Megaloptera and Neuroptera species are listed with their limits of distribution within the New Zealand subregion.

The distributions are based on north and south limits previously published (Wise 1963), on later publications [Wise 1971 (subantarctic islands), 1972 (Kermadec Is), 1973 (introduced species), 1983b (northern records), 1983c (off-shore islands), 1985 (off-shore islands) and 1988 (new introductions and northern records)] and on more recent specimen identifications.

Table 1. Megaloptera and Neuroptera of the New Zealand subregion.

MEGALOPTERA	
CORYDALIDAE	
Chauliodinae	
Archichauliodes van der Weele, 1909	
Archichauliodes diversus (Walker, 1853)	Endemic — NZ
NEUROPTERA	
CONIOPTERYGIDAE	
Aleuropteryginae	
Heteroconis Enderlein, 1905	
Heteroconis ornata Enderlein, 1905	Introduced — ex Australia
Cryptoscenea Enderlein, 1914	
Cryptoscenea australiensis (Enderlein, 1906)	Indigenous — Australia, NZsr
BEROTHIDAE	
Berothinae	
Protobiella Tillyard, 1923	
Protobiella zelandica Tillyard, 1923	Endemic — NZ
HEMEROBIIDAE	
Drepanacra Tillyard, 1916	
Drepanacra binocula (Newman, 1838)	Indigenous — Australia, NZsr, Pacific Is
Micromus Rambur, 1842	
Micromus tasmaniae (Walker, 1860)	Indigenous — Australia, NZsr, Pacific Is
Micromus bifasciatus Tillyard, 1923	Endemic — NZ
Wesmaelius Kruger, 1922	
Wesmaelius subnebulosus (Stephens, 1836)	Introduced — ex Europe
Psectra Hagen, 1866	
Psectra nakaharai New, 1988	Introduced — ex Australia
CHRYSOPIDAE	
Mallada Navas, 1925	
Mallada basalis (Walker, 1853)	Indigenous — Australia, NZsr, Pacific Is
Mallada sp. nr. *alcestes* (Banks, 1911)	Introduced — ex Pacific Is
OSMYLIDAE	
Kempyninae	
Kempynus Navas, 1912	
Kempynus incisus (McLachlan, 1863)	Endemic — NZ
Kempynus citrinus (McLachlan, 1873)	Endemic — NZ
Kempynus latiusculus (McLachlan, 1894)	Endemic — NZ
Euosmylus Kruger, 1913	
Euosmylus stellae (McLachlan, 1899)	Endemic — NZ
MYRMELEONTIDAE	
Myrmeleontinae	
Weeleus Navas, 1912	
Weeleus acutus (Walker, 1853)	Endemic — NZ

Table 2. Distribution of Megaloptera and Neuroptera in the New Zealand subregion.

	Kermadec Is	North I	Northern off-shore islands	South I	Stewart I	Chatham Is	Antipodes Is	Auckland Is
MEGALOPTERA								
Corydalidae								
Archichauliodes diversus		+	+(3)*	+				
NEUROPTERA								
Coniopterygidae								
Heteroconis ornata		+						
Cryptoscenea australiensis	+	+	+(1)	north				
Berothidae								
Protobiella zelandica		+		+				
Hemerobiidae								
Drepanacra binocula	+	+	+(6)	+		+		
Micromus tasmaniae	+	+	+(13)	+		+	+ (?intro)	+ (intro)
Micromus bifasciatus		+		+	+			
Wesmaelius subnebulosus		+		+				
Psectra nakaharai		+						
Chrysopidae								
Chrysopa basalis	+		+(1)					
Mallada sp.		+						
Osmylidae								
Kempynus incisus		+		+				
Kempynus citrinus		+						
Kempynus latiusculus		middle		middle				
Euosmylus stellae		middle		middle				
Myrmeleontidae								
Weeleus acutus		+	+(2)	+				

* Number of northern off-shore islands groups.

Almost New Zealand-wide endemic species are shown in Fig. 1.

In the Megaloptera, *Archichauliodes diversus* has been recorded from the north of the North I to the south of the South I and from off-shore islands.

In the Neuroptera, *Protobiella zelandica* is still known only from the earlier north to south limits (Wise 1963). *Micromus bifasciatus*, known in 1963 from mid-North I to the south of the South I, has since been recorded further north and is now known from specimens taken on Stewart I. *Kempynus incisus*, recorded earlier from a northern North I area to a southern South I area, is now known further north from specimens collected.

Distributions of the other endemic Neuroptera species are shown in Fig. 2.

Kempynus citrinus is restricted to the North I but has been collected further north than it was earlier. *Kempynus latiusculus* and *Euosmylus stellae* occur from the central North I plateau to the middle of the South I as earlier recorded. *Weeleus acutus* has been taken further north in the North I than before and has also been found on the northern off-shore islands. The southern limit remains the same.

The species here considered to be indigenous, having been naturally distributed to New Zealand by wind, are given in Fig. 3. They all occur on the Kermadec Is. The occurrence of all four species on the New Zealand northern off-shore islands is further evidence of their mobility.

Cryptoscenea australiensis was earlier noted from the northern North I to the northern South I and has since been recorded from the Kermadec Is, from further north on the North I than before and from an off-shore island.

Drepanacra binocula was earlier known from Kermadec Is, from the northern North I to the south of the South I, and from Chatham Is. Specimens have since been collected further north in the North I and from off-shore islands.

Micromus tasmaniae was known from the northern North I to the south of the South I and from Chatham Is. Records for the subantarctic Auckland and Antipodes Is may have resulted from artificial introductions. The species has also been recorded from the Kermadec Is, from off-shore islands and has been collected further north in the North I.

Chrysopa basalis has been recorded from the Kermadec Is and from one small island off the northern North I.

The species indicated in Fig. 4 are here considered to be accidentally introduced as there is no evidence of them occurring naturally.

Heteroconis ornata was first recorded in New Zealand from a specimen collected in Auckland in 1988. Another was taken at the same place in 1990 and a small colony found in the outer western suburbs in 1989, so the species is established locally.

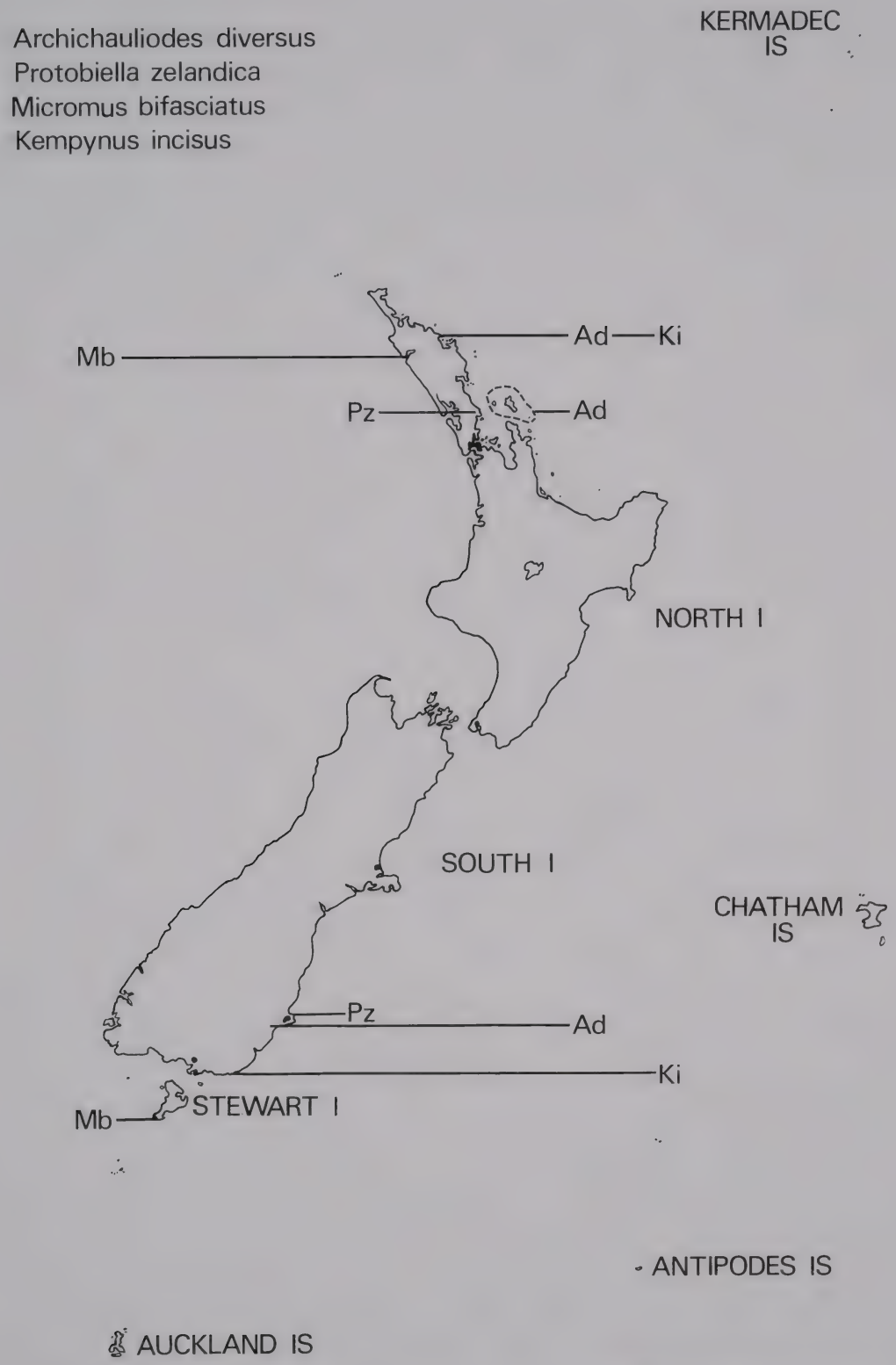

Fig. 1. New Zealand subregion. Distribution limits of New Zealand-wide endemic Megaloptera and Neuroptera species.

Kempynus citrinus
Kempynus latiusculus
Euosmylus stellae
Weeleus acutus

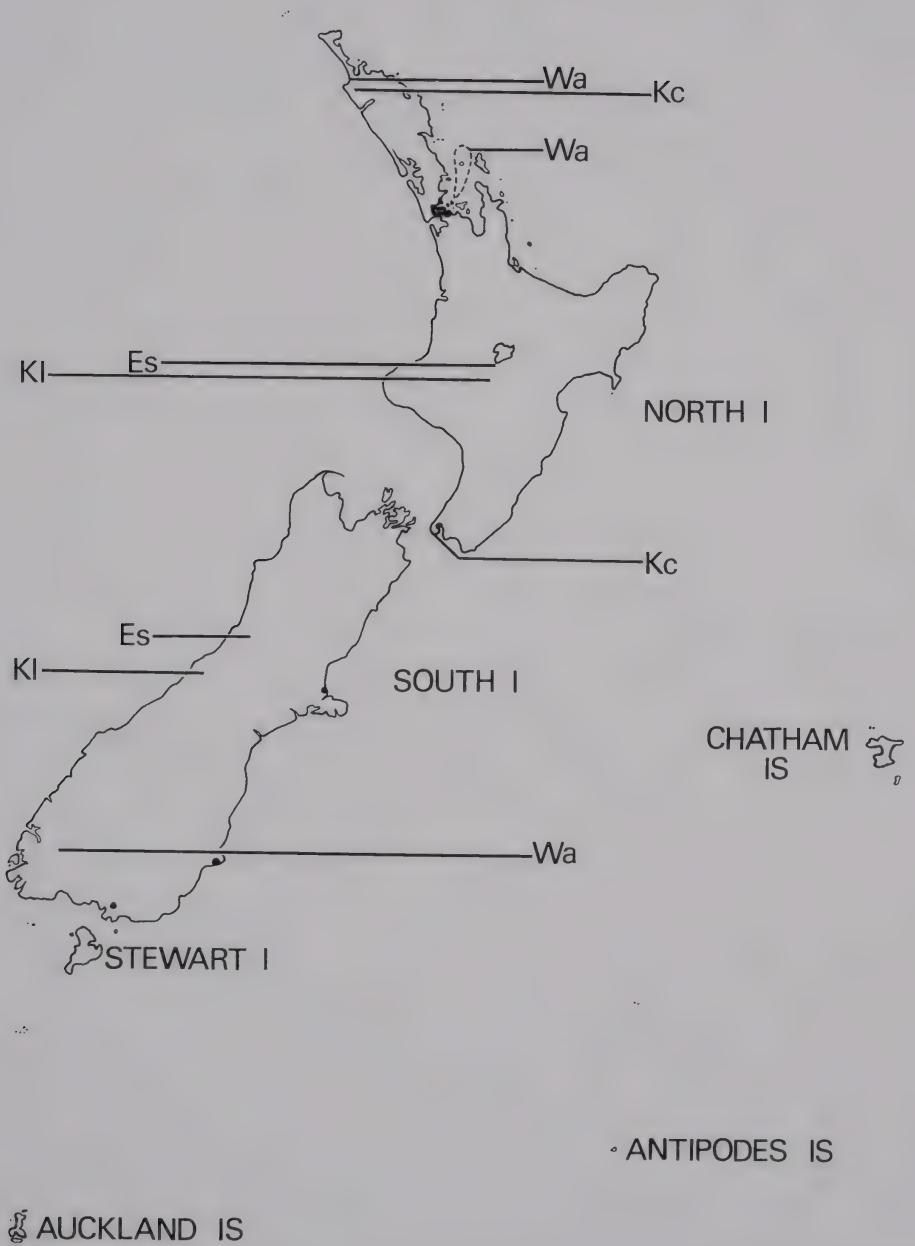

Fig. 2. New Zealand subregion. Distribution limits of other New Zealand endemic Neuroptera species.

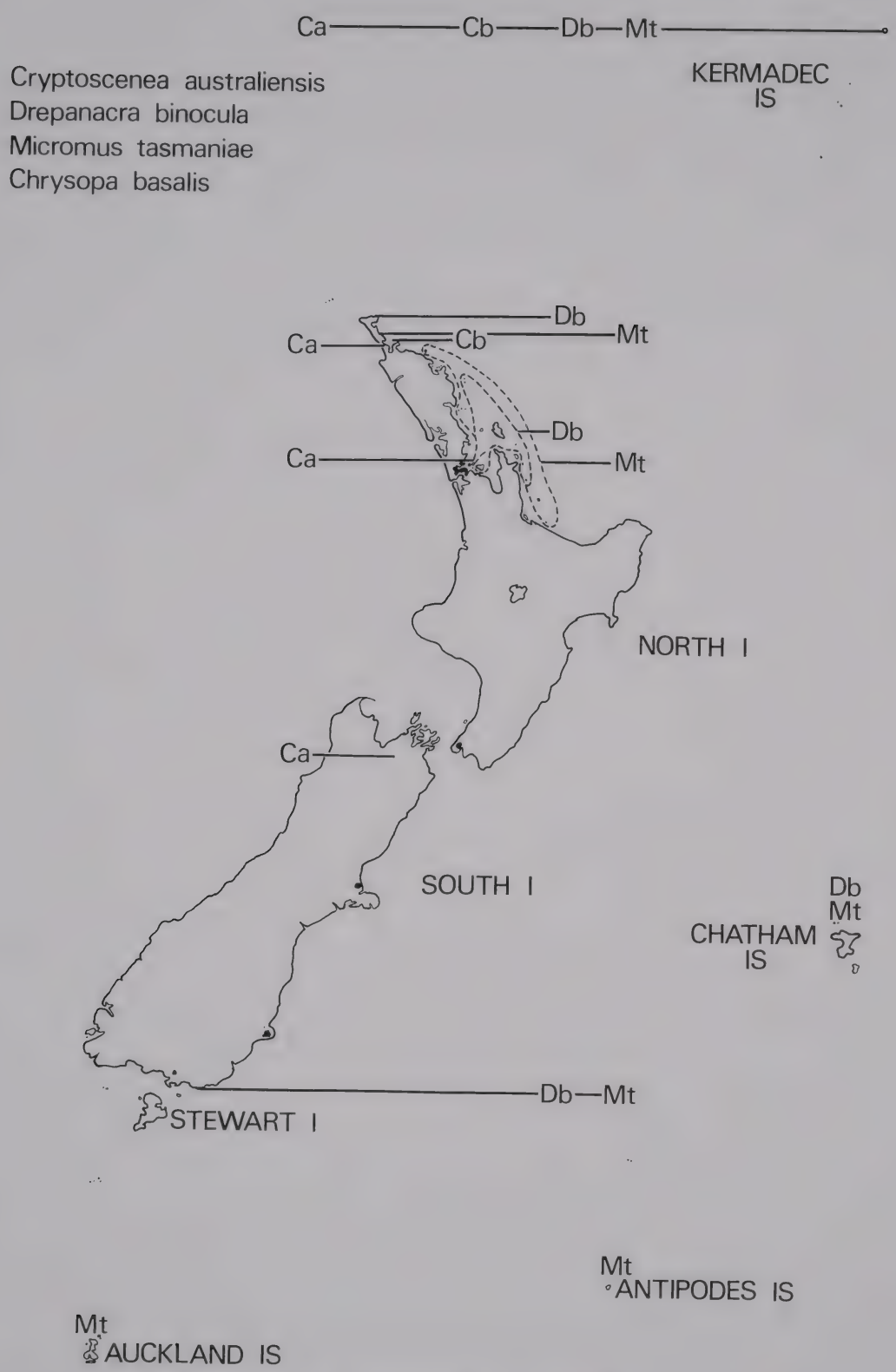

Fig. 3. New Zealand subregion. Distribution limits of New Zealand indigenous Neuroptera species.

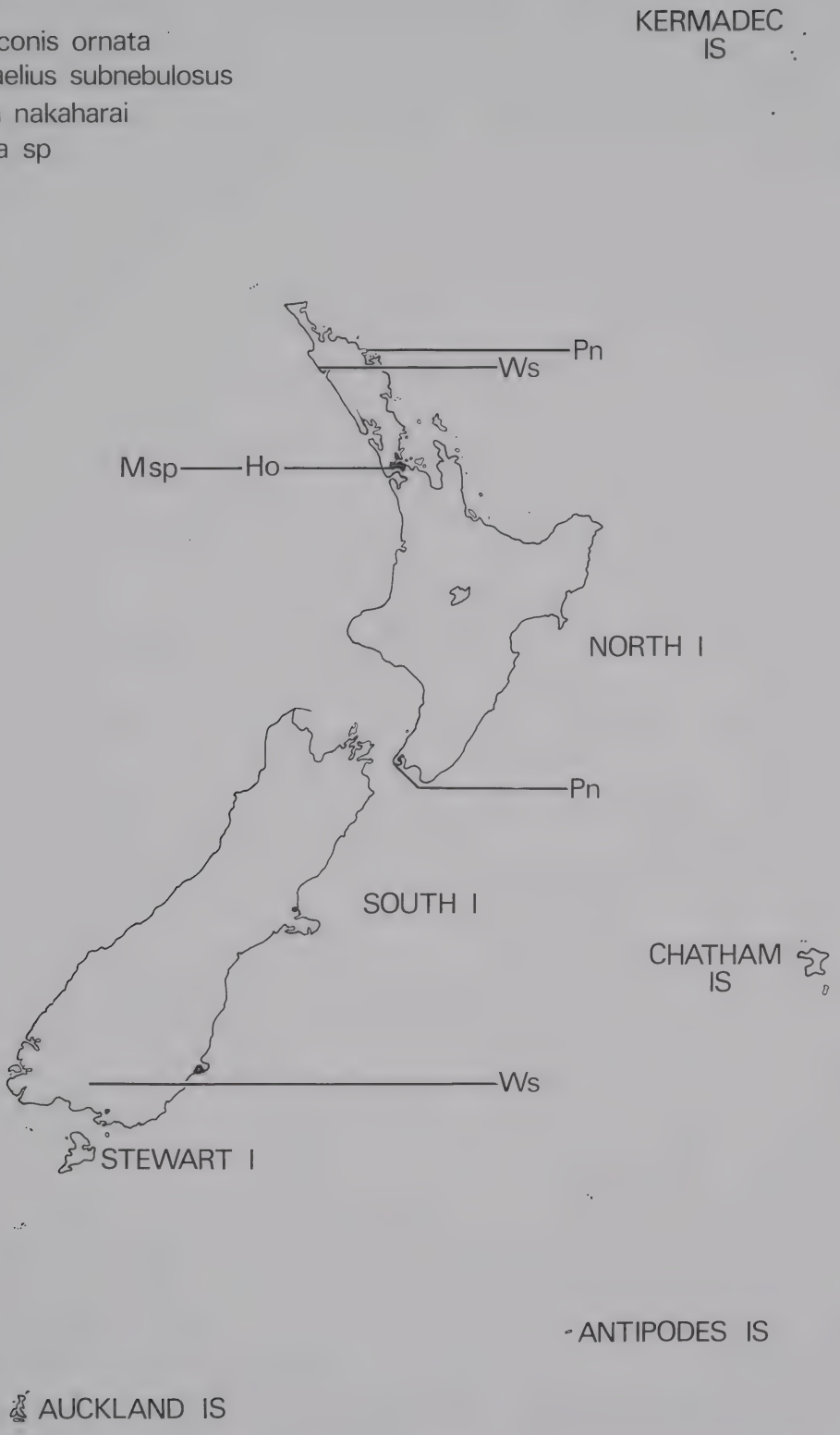

Fig. 4. New Zealand subregion. Distribution limits of New Zealand accidentally introduced Neuroptera species.

Wesmaelius subnebulosus was first collected in New Zealand in Dunedin in 1920. It is a common European species although first recorded in New Zealand as an endemic species, *Boriomyia maorica* Tillyard, 1923. It became widespread in both the North and South Is and is now known further north and further south.

Psectra nakaharai was first taken in the outer western suburbs of Auckland in 1971 and was recorded temporarily in the *Sympherobius* group. It is now widespread in the North I.

One live Chrysopid, taken on pineapple in Auckland in 1988, was first recorded as *Chrysopa* sp. and thought possibly to be an import from Australia. It is now recognised as *Mallada* sp. near *alcestes*, a species which is not recorded from Australia but is known from north-western Pacific Is.

WIDER DISTRIBUTIONS

In Table 3 general distributions for all species are given.

Further consideration of the species indigenous to New Zealand suggests distribution by west wind drift. This well-known phenomenon is responsible for the occurrence of many insects in the Pacific and New Zealand. However, the continual west wind is at high altitudes and I suggest that many insects are blown across the Tasman Sea at lower altitudes. Low pressure systems circulating in a clock-wise direction traverse the Tasman Sea from below Australia and any insects picked up on the front of the system would be carried southwards and eastwards and would thus travel in an arcuate or sigmoid curve. The possibility of low altitude flights by insects, including lacewings, has been well confirmed by dispersal studies with nets and collections on ships at sea (Wise 1983a).

In the Coniopterygidae (Fig. 5) *Cryptoscenea australiensis* occurs in eastern Australia (Meinander 1979) and extends eastwards to Kermadec Is and New Zealand (as above). By comparison *Cryptoscenea obscurior* Meinander, 1972 is distributed from Queensland and New South Wales to Lord Howe I (Meinander 1979, Lambkin & New 1989).

The Hemerobiidae (Fig. 6) includes two widely spread and common species. *Drepanacra binocula* occurs in most states of Australia (New 1988) and extends eastwards and southwards to Lord Howe I (confirmed by specimen in ANIC, Canberra), Norfolk I (New 1987), Kermadec Is and New Zealand. *Micromus tasmaniae* is widespread throughout Australia (New 1988), and is present eastwards on New Caledonia (Nakahara 1960), New Hebrides (Kimmins 1958), Lord Howe (Lambkin & New 1989), Norfolk (New 1987) and Kermadec Is, and in New Zealand. In addition, *Micromus tasmaniae* has been taken at sea several times during dispersal projects (Pacific — Wise 1983a; Australia — unpubl.) as indicated by the arrows (Fig. 6) which show the ship direction and distance of travel since the start of a net run or the previous collection (numbers in brackets are specimens where more than one).

Table 3. Distributions of New Zealand Megaloptera and Neuroptera in Australia and the South Pacific.

	Australia	New Caledonia New Hebrides	Lord Howe I	Norfolk Is	Kermadec Is	New Zealand	Samoa	Cook Is	Society Austral Tuamotu Marquesas Easter Is
MEGALOPTERA									
Corydalidae									
Archichauliodes diversus						+			
NEUROPTERA									
Coniopterygidae									
Heteroconis ornata	+					+			
Cryptoscenea australiensis	+				+	+			
Berothidae									
Protobiella zelandica						+			
Hemerobiidae									
Drepanacra binocula	+		+	+	+	+			
Micromus tasmaniae	+	+	+	+	+	+			
Micromus bifasciatus						+			
Wesmaelius subnebulosus						+			
Psectra nakaharai	+					+			
Chrysopidae									
Chrysopa basalis	+	+			+	+	+	+	+
Mallada sp.						+			
Osmylidae									
Kempynus incisus						+			
Kempynus citrinus						+			
Kempynus latiusculus						+			
Euosmylus stellae						+			
Myrmeleontidae									
Weeleus acutus						+			

Fig. 5. Southern Pacific area. Distribution of Neuroptera: Coniopterygidae species.

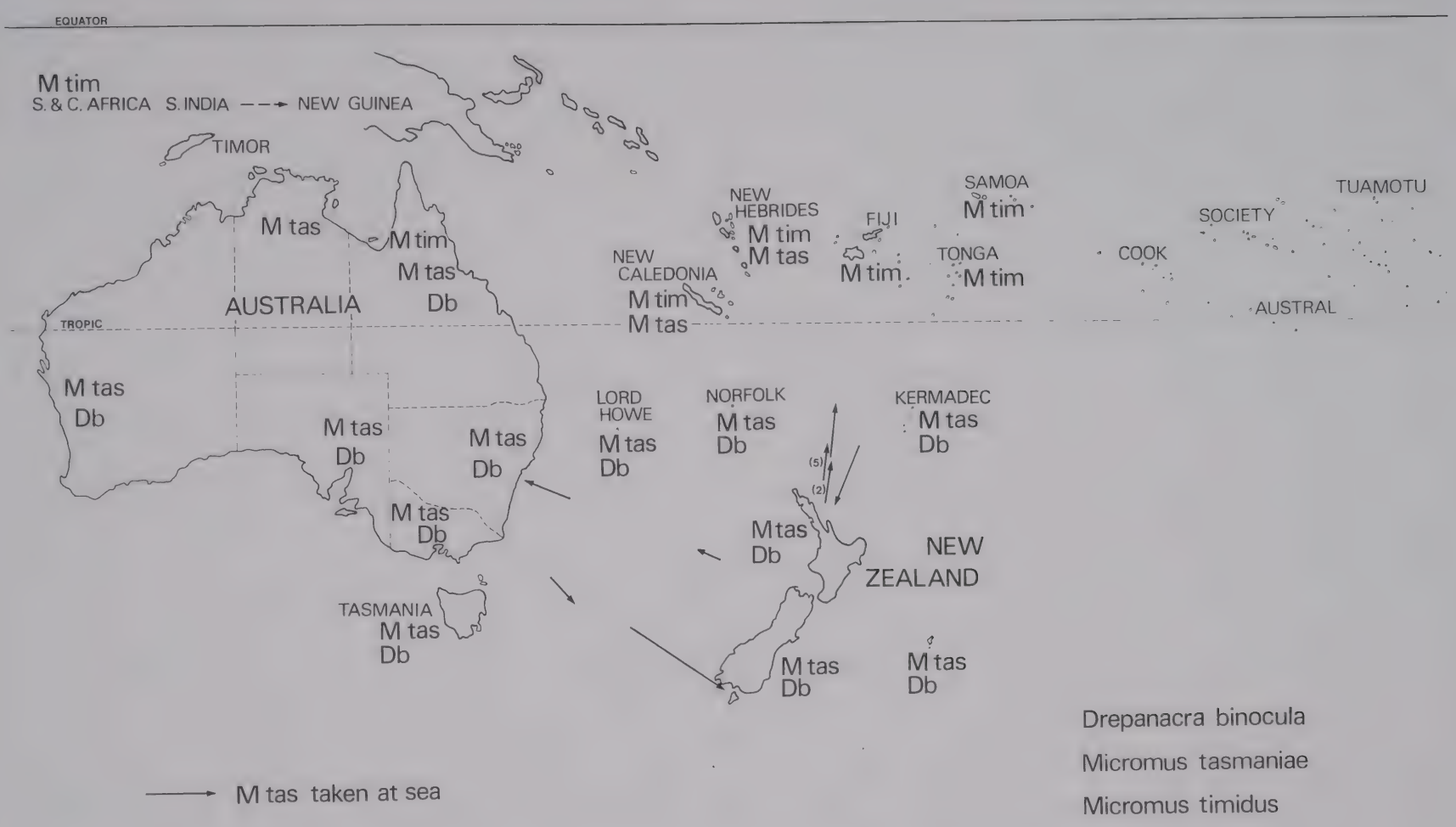

Fig. 6. Southern Pacific area. Distribution of Neuroptera: Hemerobiidae species.

By contrast, *Micromus timidus* Hagen, 1853 is naturally widespread from South and Central Africa eastward through the tropical belt to New Guinea, northern Queensland (in Australia), New Caledonia, New Hebrides, Fiji, Samoa (Tjeder 1961) and Tonga (from specimens).

In the Chrysopidae several species occur in Australia and are widespread in the tropical belt eastwards across the Pacific. For example (Fig. 7), *Chrysopa ramburi* [now *Plesiochrysa ramburi* (Schneider, 1851)] is recorded in Malaya, Timor, the whole of Australia (except Tasmania), Lord Howe I (New 1980), and islands to the east as far as Tonga, Samoa, Society Is (Adams 1959, New 1980) and Cook Is (Walker & Dietz 1979). Only *Chrysopa basalis*, which occurs in Eastern Australia (New 1980), New Caledonia (Kimmins 1958), New Hebrides (Kimmins 1958) and island groups further north, has extended further south as well as eastwards. It is recorded through the Pacific Is from Samoa to Easter I (Adams 1959), including the Cook Is (Walker & Deitz 1979), in the Kermadec Is and on a small off-shore island in the far north of New Zealand.

ZOOGEOGRAPHY

The zoogeographical relationships of the New Zealand Megaloptera and Neuroptera (Fig. 8) appear to be mainly with Australia.

In the Megaloptera, *Archichauliodes* contains many species in Australia (Theischinger 1983), one in New Zealand and is present in South America. This distribution suggests a connection through the ancient southern Gondwanaland and the New Zealand species has been noted (Riek 1954) as being close to one of the Australian species, *A. anagaurus* Riek, 1954.

In the Neuroptera, the two Coniopterygid species are Australian.

The Berothid endemic genus *Protobiella* is in the Berothinae and (according to Aspöck & Aspöck 1985) is most closely related to an Australian genus *Austroberothella* Aspöck & Aspöck, 1985. It may have an association through a southern Gondwana influence.

Three of the five species of Hemerobiidae are Australian. The endemic *Micromus bifasciatus* is very close to *M. tasmaniae* and also may have arisen following the southern Gondwana connection. The fifth species was introduced from Europe.

One of the Chrysopid species is also present in Australia and the Pacific Is, while the other may be introduced from the Pacific Is.

The four endemic species in the Osmylidae are in two related genera, *Kempynus* and *Euosmylus* of the Kempyninae. *Kempynus* also contains species in Australia and South America suggesting a southern Gondwana influence.

The one Myrmeleontid species is in the endemic genus *Weeleus* which is very close to the world-wide *Myrmeleon* and may also have separated from an Australian line since a southern Gondwana separation.

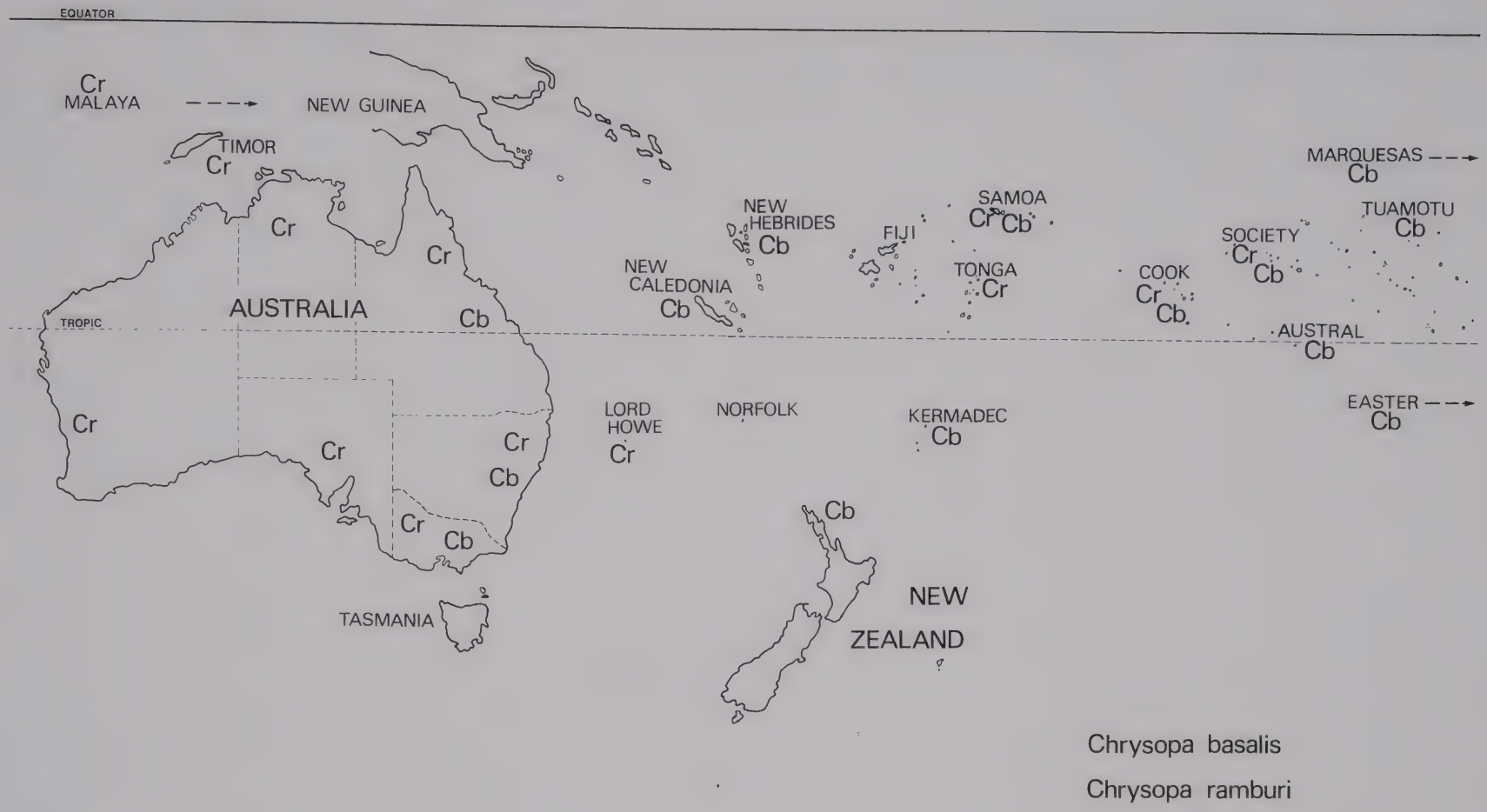

Fig. 7. Southern Pacific area. Distribution of Neuroptera: Chrysopidae species.

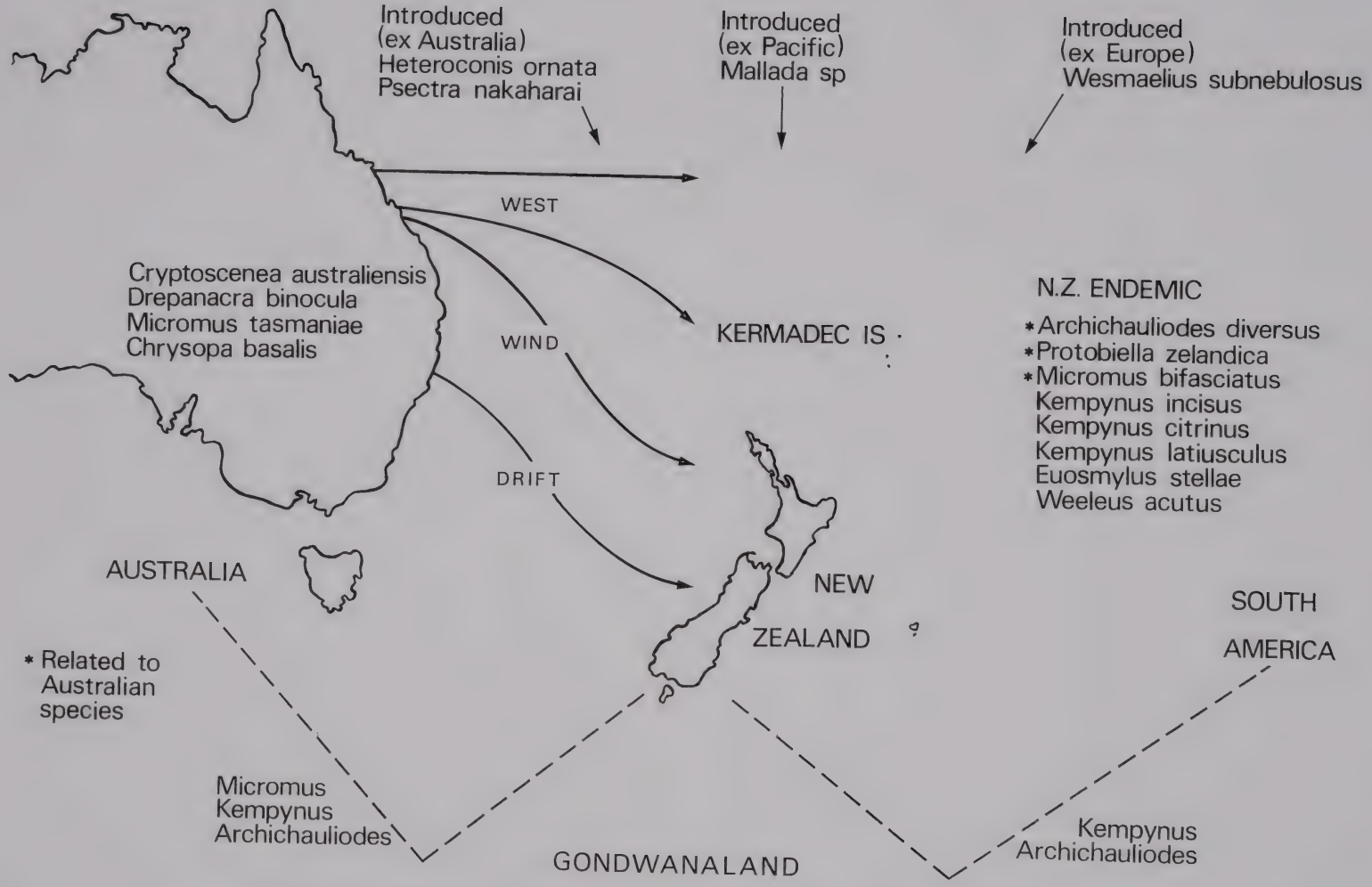

Fig. 8. Schematic diagram indicating possible zoogeographical relationships of New Zealand Megaloptera and Neuroptera.

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